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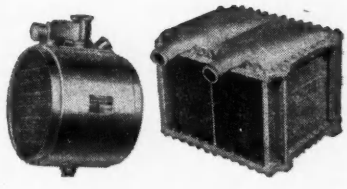

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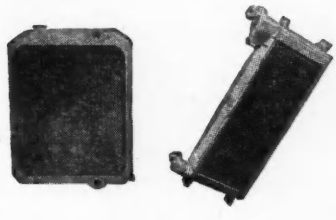

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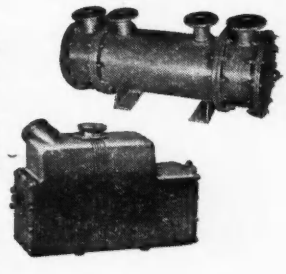

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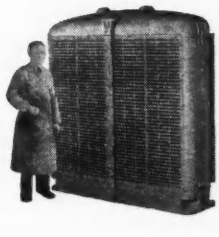

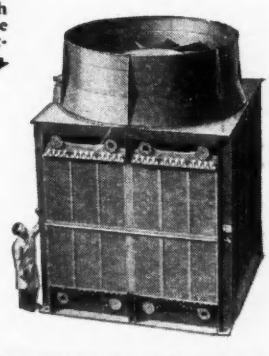

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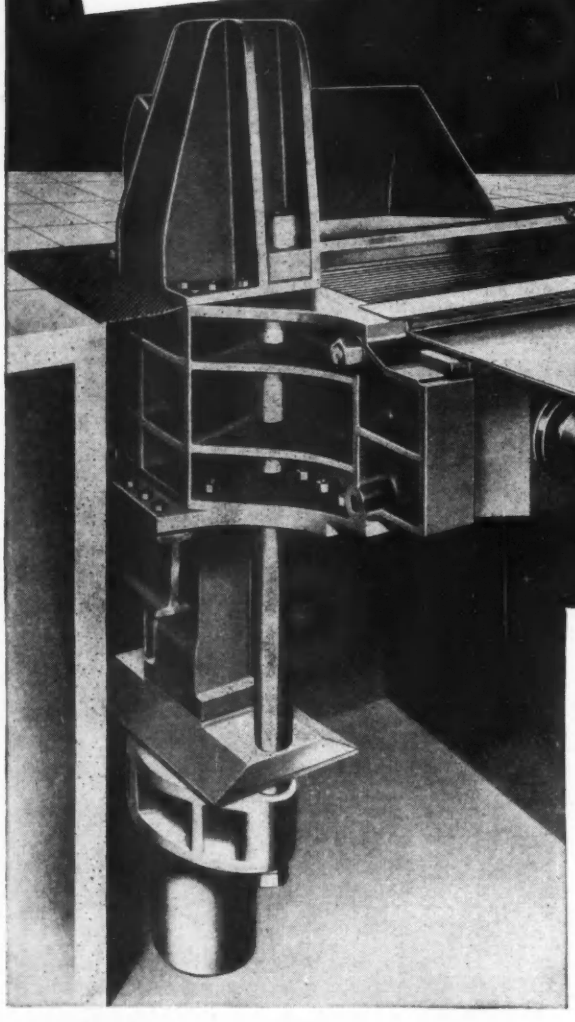

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AUTOMOTIVE and AVIATION INDUSTRIES

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Economic Epigrams

By John W. Scoville

THE remedy for a bad law is repeal, not better administration.

* * *

Many people want freedom for themselves, but regulation for the other fellow.

* * *

Our federal government is in the awkward and inconsistent position of prosecuting industrial combinations and encouraging labor combinations.

* * *

No cause is hopeless if it is just. Errors, no matter how popular, carry the seeds of their own destruction. Bacon said: "Truth is the daughter of Time."

* * *

Prosperity comes from a large output of goods and services, when larger numbers are working and when the average productivity of workers is high.

* * *

In a free competitive system, no worker, employer, merchant or manufacturer can deviate far from the paths of justice and fairness and still prosper.

* * *

Industries that are hurt by competition ought to be hurt. Competition not only rewards those who serve society, it also punishes those who do not serve society.

* * *

The battle against injustice is never hopeless. I cannot understand why so many industrialists take a defeatist attitude and believe that falsehood and injustice will triumph.

* * *

There is nothing in our history to indicate that laws on the statute books are irrevocable. We should fight against evils and not be deterred by the fear that we may not win.

* * *

No one should be compelled to get permission or pay money for the privilege of marketing his labor. No man should have the right to put several thousand workers on the auction block—and bargain with an employer for their services. It is an affront to human dignity to sell a drove of workmen as if they were cattle, hogs or sheep.

* * *

In a free society, competition keeps everyone in line—each one is restrained by his competitors. If doctors earn more than lawyers, then college students will study medicine rather than law, and this will lower the income of the doctors and raise the income of lawyers. If factory workers earn more than farmers, then farm boys will leave the farms and come to the cities, and this migration will tend to equalize the incomes. The free society is self-regulating.

Statement of Position—

Until the present tight steel situation is eased, there will be an unbalanced condition in all steel stocks.

There are three principal reasons for this:

1. Labor and coal shortages are currently lowering steel production.
2. Every industry is anxious to get on with reconversion and peacetime production.
3. There is a tremendous backlog of maintenance and repair requirements.

Ryerson stocks, largest in the nation, reflect current conditions. And because of the great load, it is not always possible to supply the desired steel or deliver available steel as quickly as usual. But we are doing everything we can to satisfy every customer's requirements.

When a certain kind or size of steel is not immediately available, every effort is made to suggest satisfactory alternates which buyers may use with confidence.

Ryerson's 103 years of experience in maintaining large and complete stocks and working closely with all industries, makes the recommendations of Ryerson metallurgists and engineers particularly practical and helpful.

We thank our customers for their courtesy and patience, for the confidence they have placed in our judgment when alternates for wanted steels have had to be offered, and for understanding our position.

Ryerson will continue to serve you to the best of its ability from its eleven strategically located plants. Stocks will be brought to normal as quickly as possible. This means that Ryerson will be among the first to have more complete stocks of present scarce steels—that Ryerson will continue to be the largest stock source for steel in the country.

Everett D. Graff
President
JOSEPH T. RYERSON & SON, INC.

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Industry Opposes Basing Factory Wage Rates on Company Profits

By Leonard Westrate

THE current struggle between the automotive industry and the UAW-CIO over the demand for a 30 per cent pay increase has resolved into a battle of statistics, philosophy and public relations. All of these weapons have been used more freely by the union than by management to date, but both sides undoubtedly will bear down more heavily as the situation approaches a climax. The general belief in Detroit now is that the struggle will come to a head about the first of the year, although there is reason to believe that it might come sooner if a settlement is reached now. There already have been noticeable stirrings of unrest from peppery locals, and there is doubt among some of the more seasoned labor observers that the international union can hold its subsidiary groups in line.

After the first brush between the union, represented by Walter Ruether, UAW-CIO vice president, and General Motors, it is apparent that several new elements have entered the collective bargaining picture. The first point is the insistent concern of the union with the matter of product prices in relation to profits and wages. Heretofore the union has been primarily interested in getting higher wages for its members with little regard for where the increase came from. Now, however, it is fighting tooth and nail for higher pay, but with no corresponding increase in prices of automobiles. Ruether knows that any pay increase which brought about higher car prices would be inflationary and the blame could be charged directly to the union. Also it has long been obvious that he is working for a redistribution of profits to the advantage of the factory workers.

It also is apparent that the unions see in the present situation a chance to gain a foothold in participation in management decisions, long a major objective among UAW leaders. If through public pressure and threat of strike the union can force management to divulge information on production costs, it is hopeful of being in a position to tie factory hourly wage rates to profits and prices in future negotiations, but such an accomplishment is very doubtful.

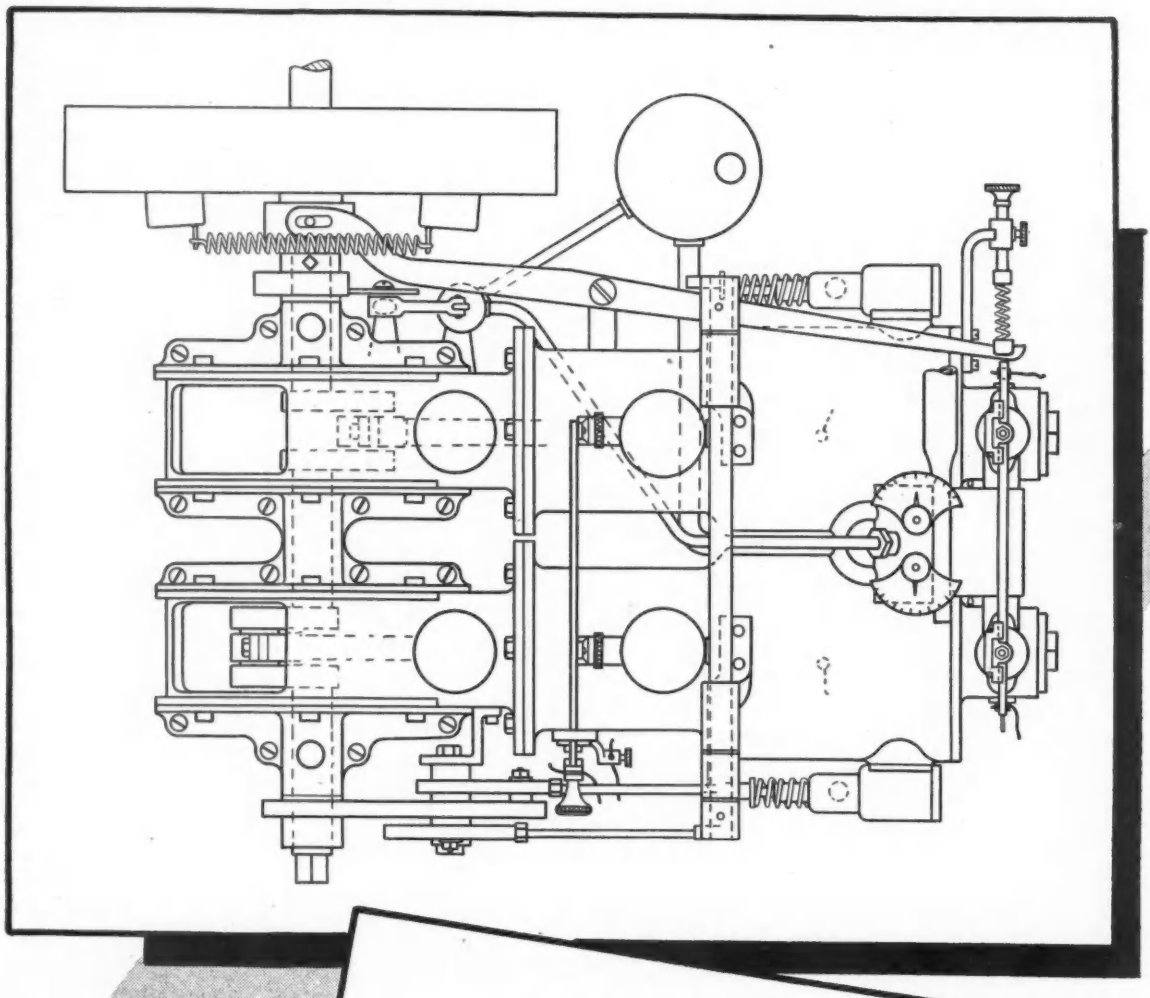
This contention is related directly to one of the main points of issue between GM and the union—whether factory wage rates are to be determined by the ability to pay or by competition in a free labor market with other companies in the industry. In essence it boils down to the question of whether the factory workers are to share as an economic unit in direct relation to the profits of management. General Motors has taken the stand that as long as it pays prevailing wage rates or higher rates than other companies, the question of company profits has no bearing on the wage issue. This dispute as to what yardstick shall be used in determining wage rates is one of the basic and most important questions that will have to be settled.

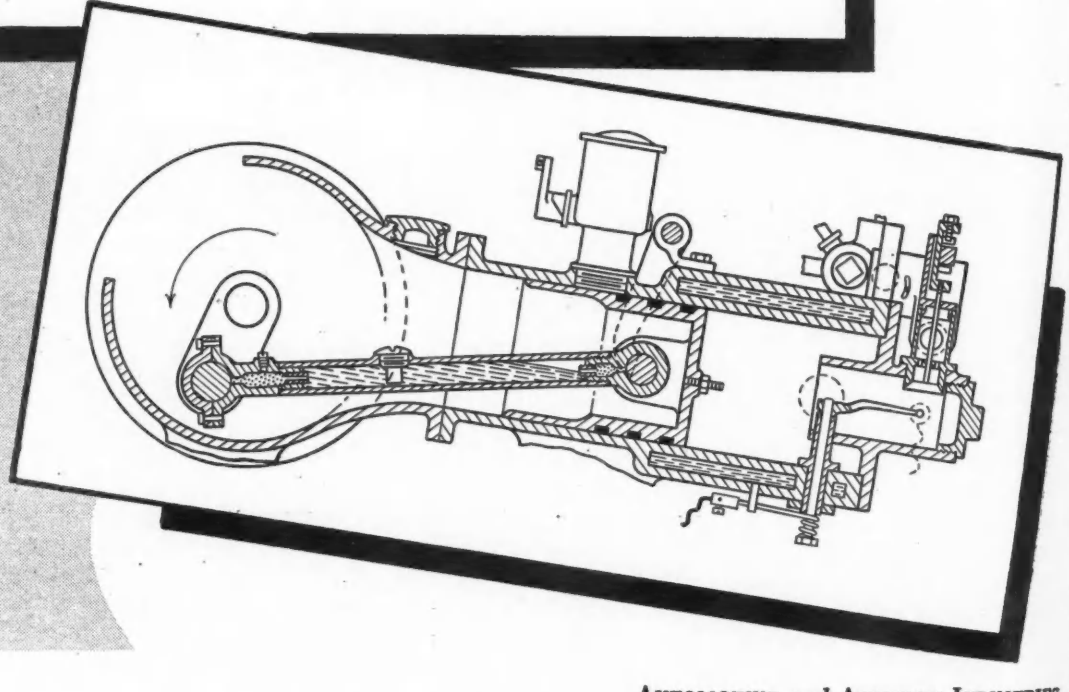
Production costs have long been considered the sole property of the manufacturer. However, the union, in a long and complicated brief, represents that GM can meet the 30 per cent wage demand and still make more profit than in prewar years on the basis of expanded volume. The report is well larded with impressive sounding statistics lifted from Government reports and from GM's own financial statements. However, it does not square with the statement of C. E. Wilson, president of General Motors, who said recently that production must go up 50 per cent, that

(*Turn to page* 122, *please*)

Golden A

As the automobile industry swings into peacetime production again this fall, after an interval of over three years, it at the same time enters upon its second half-century. Automobile development in this country received its first impetus from the *Times-Herald* race, which was run in Chicago on Thanksgiving Day, Nov. 28, 1895. This year's Thanksgiving therefore marks the golden anniversary of the American motor car industry. A brief account of the conditions under which the industry came into being should prove of interest to those now engaged in it, most of whom, of course, had not been born at the time. I was then living in Chicago and attended the race, and the following account of it is based partly on personal observations, partly on a recent interview with





(Above) Plan view of Duryea 1895 engine.

(Right) Section through cylinder axis of Duryea engine.

By P. M. Heldt

Anniversary

of Automobile Industry Recalls the Times-Herald Race of 1895

AS this article is being written plans are on foot for an anniversary celebration at Chicago on Thanksgiving Day, in which the Chicago Museum of Science and Industry, the Automobile Old-Timers, and the Society of Automotive Engineers will take part. J. Frank Duryea, winner of the Times-Herald *race, is now reconditioning a 1896 Duryea car, similar in many respects to the one in which he won the race, and plans to drive it over the same course over which the race was held. In order to provide it with tires of the same size the race-winner carried (2.5-in. pneumatics), the United States Rubber Co. made special molds, as this particular size is no longer being made commercially. It is to be hoped that the weather conditions will be more favorable than they were in 1895, for a drive of 54 miles in an open car of 1896 vintage, in freezing weather through deep snow would really seem to be too arduous for a man of 76,*

he winner, and partly on a perusal of various reports of the race published at the time.

While at his club one day, H. H. Kohlsaat, publisher of the *Times-Herald*, a Chicago daily, read in a French illustrated weekly an account of an automobile race which had been held under the auspices of *Le Petit Journal*, then the most widely read newspaper in France. The circulation-building possibilities of such an undertaking must have appealed to him, for he immediately thought of organizing such a contest here. The United States at the time was still suffering from the depression which followed the financial crash of 1892, and the establishment of a new industry, similar to the electrical and bicycle industries, then in their infancies, promised to provide employment and to prove of help in getting business out of the doldrums.

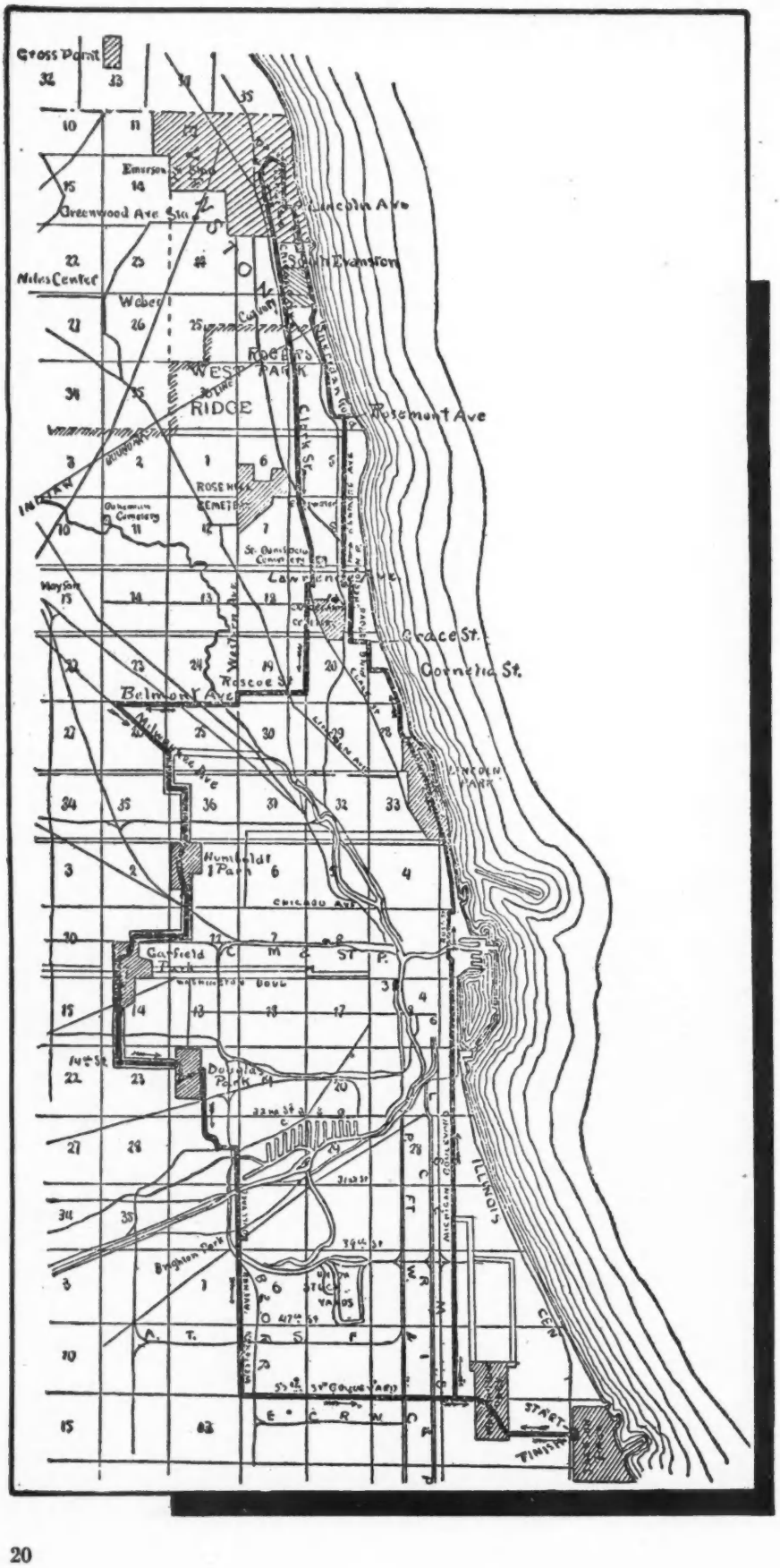
After talking the matter over with a member of his staff, Kohlsaat decided to donate $5000 for prize money, and another $5000 for organizing expenses. Rules and regulations were drafted and published, and the contest was set for July 4. The response was immediate

Duryea car (winner) at start of Times-Herald *Race. J. Frank Duryea, driver, is at the tiller.*

and enthusiastic. No fewer than 60 entries were received, but many of them were from impecunious inventors whose vehicles existed as yet only on paper or in their own minds. They importuned Kohlsaat to assist them financially so they could complete their vehicles, but this he considered outside his provinc The publisher, who then believed that the motor ve hicle would find its chief application in the transport tion of freight over the highways and in militar service, asked President Cleveland to appoint an Arm man to take charge of the even and the task was assigned t General Merritt. One of the la ter's first acts was to appoint committee of civilians to act a judges, including H. H. Timke a carriage manufacturer, an John P. Barrett, head of th Chicago Department of Ele tricity. Leland L. Summers an John Lundie, two young engi neers, were engaged to act a technical advisers and to mak preliminary tests of the vehicle entered.

When the date of the competi tion approached, only one of th cars entered, the Haynes-Apper son, was ready. A postponemen was seen to be necessary, an Labor Day, Sept. 2, was the ne date selected. In August it be came evident that the even would have to be postponed onc more, and it was set for Nov. 2 Then followed another postpone ment to Thanksgiving Day.

In the meantime the public whose interest in the race ha been aroused by sustained pub licity, became somewhat im patient at the delays, and t humor them, and also to satisf those entrants who were read with their vehicles, a specia match race was arranged be tween a Duryea carriage buil by the Duryea Motor Wagon Co of Springfield, Mass., and a Benz imported by the H. Muelle Manufacturing Co., of Decatur Ill., for a purse of $500. Thi consolation race was held Nov 2, over a course from Washing ton Park, Chicago, north t Waukegan, Ill., and back ove another route to Grant's monu ment in Lincoln Park, Chicago A time limit of 13 hours was se for the run of 92 miles. Breaki ing of the differential housing due to plunging into a ditc while trying to avoid a collisio



***Route of Chicago* Times-Herald *Race in 1895. (From December, 1895, issue of* The Horseless Age)**

ith a team hauling an empty ayrack, put the Duryea out of he race, and the event was won y the Mueller-Benx in 9½ hr. The farmer was traveling in the ame direction as the motor vehicle, but was over on the left ide of the road, and as the notor vehicle approached he ulled his team sharply to the ight, thereby practically blocking the road.

As a further means to keep nterest in the subject alive during this waiting period, the *Times-Herald* organized a competition for a better name for he new vehicle, then generally eferred to as a horseless carriage. A prize of $500 was offered for the best name suggested, and was awarded for the erm "motocycle." The choice, however, evidently was not a happy one, for although it was used in the technical report on the contest, it never achieved any degree of popularity and soon passed out of existence altogether, except for the fact that it continues to live on in the name of one of the oldest firms in the industry, the Indian Motocycle Co.

When the date of the main race finally arrived, the weather and road conditions were most discouraging. Between six and eight inches of snow had fallen during the previous week, some of it during the night preceding the race. At some parts of the route the frozen crust had not been broken, while at others the continued cold weather and the traffic had caused the snow to be worked into a powdery mass resembling fine, dry sand. Not only was the resistance to motion greatly increased by the snow, but the tires frequently lost their grip, and steering and propulsion were equally uncertain.

These unfavorable weather conditions largely explain why, although 11 of the entrants were in Chicago with their cars, only six faced the starter. Among the non-starters was the Haynes-Apperson, which had been in the city for quite some time, but broke a wheel trying to avoid a collision with a trolley car while on the way to the start.

The start took place at the junction of Midway Plaisance with Jackson Park on the South Side of Chicago. The route closely followed the Lake Shore most of the way to Evanston, where it turned and led back to the starting point, over a course at some distance from the shore, through Humboldt, Garfield, and Douglas Parks.

According to the rules, awards were to be made primarily on the bases of utility, adaptability, excellence of design, cost, and economy, and only secondarily on the basis of speed. Each of the competing vehicles carried an umpire. Only such repairs were permitted as could be made by the drivers themselves, with the possible assistance of the umpires. Originally a time limit of seven hours had been set for the run of 54.3 miles, but in view of the road conditions obtaining on the day of the race, this was extended to 13 hours.

Specifications of Vehicles Tested for *Times-Herald* Race

Name of Vehicle	Motive Power	Number of Cylinders, Bore and Stroke	Wheel-base, In.	Tread (Rear)	Weight Lb.
D.1.V.–Benz	Gasoline	1–5.12 x 6.62 in.	66.7	..	1680
Duryea	Gasoline	2–4 x 4.5 in.	57.5	55	1208
Haynes-Apperson	Gasoline	2–4 x 4 in.	54	55	1250
Lewis	Gasoline	1–5 x 5 in.	56	46½	1680
Mueller-Benz	Gasoline	1–5.5 x 6.25 in.	73	50	1636
Macy Roger	Gasoline	1–5 x 7 in.	67	52	1825
Morris & Salem	Electric	....	49	44	1650
Sturges	Electric	....	65	57	3535

Of the six vehicles which were officially started, four were propelled by gasoline engines and two by electric motors supplied with current from storage batteries. The starting vehicles were entered by the following firms:

Duryea Motor Wagon Co., Springfield, Mass.

H. Mueller Manufacturing Co., Decatur, Ill.

De la Vergne Refrigerating Machine Co., New York.

R. H. Macy & Co., New York.

Morris & Salom, Philadelphia.

Sturges Electric Motocycle Co., Chicago.

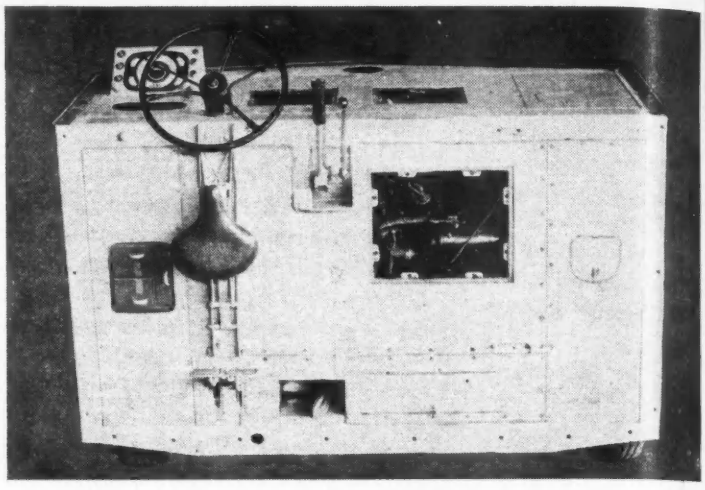
Except for the Duryea car, all of the other three gasoline cars which started were modified Benz cars, based on designs of Carl Benz of Mannheim, Germany. The car entered by the H. Mueller Manufacturing Co. had been imported in April, 1895. It had given a great deal of trouble in operation, and many changes had been made in its construction, so that the company felt justified in calling it a Mueller-Benz car. The De la Vergne Refrigerating Machine Co. presented its car as its own creation, though it must have been based on Benz design, as the "family resemblance" was quite marked. The car entered by the New York Department store of R. H. Macy & Co. was known as a Roger. It had been built in Paris under Benz license, largely from parts imported from Mannheim. Both the Mueller and the Roger cars had belt drive with cone pulleys, but the De la Vergne car had a gear drive.

The smaller one of the two electric vehicles was built in Philadelphia by Morris & Salom, and was driven in the race by Henry G. Morris, Hiram Percy Maxim

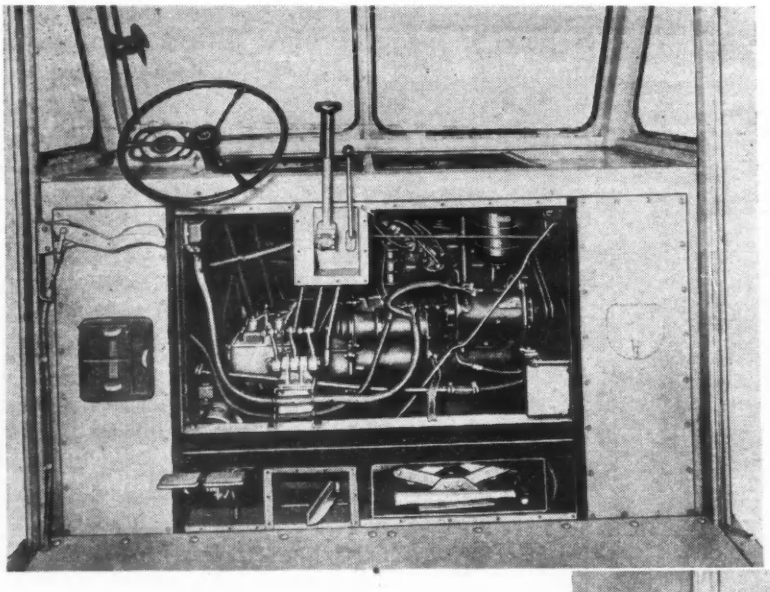
(*Turn to page 92, please*)

A NEW house-to-house delivery vehicle, called the Delivr-All, has been placed in production by the Marmon-Herrington Co. at its Indianapolis plant. It is equipped with a front drive with the power plant, steering gear and all operating controls combined in a single unit, which can be detached easily from the truck body for servicing. Another outstanding feature is the monocoque body type of construction that provides the necessary rigidity to support the load without a conventional chassis frame. An exterior view of this new delivery vehicle was published in the News of the Industry section in the Nov. 1. issue of AUTOMOTIVE AND AVIATION INDUSTRIES.

By utilizing a front wheel drive, a propeller shaft, rear axle and its differential are eliminated, which makes possible the lowering of the floor to a height of 13 in. to 14 in. above the pavement. Rear wheels



Marmon-

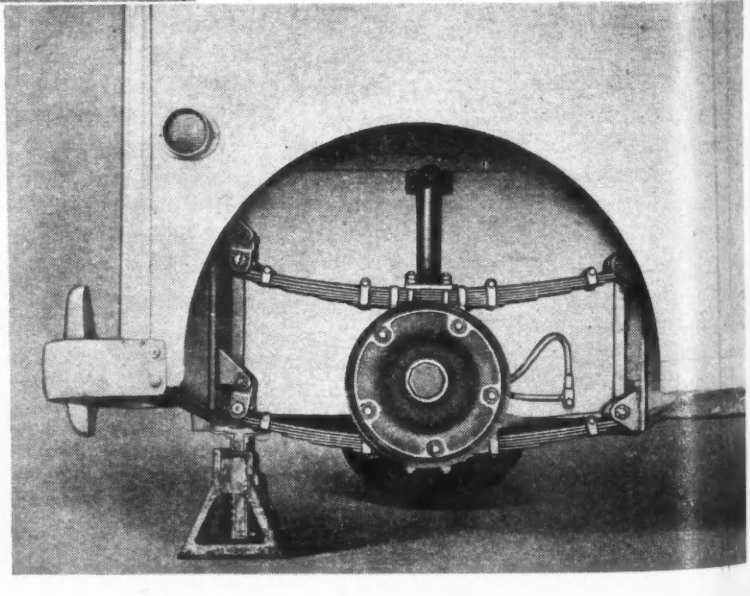


(Above) Rear view of front power unit (panel removed) showing transverse mounting of engine, clutch and transmission.

are independently sprung, each by means of two semi-elliptic springs. Front suspension is of normal Hotchkiss type with a torsion spring mounted at the center of the axle. This arrangement is said to permit the use of lower rate chassis springs for easier riding.

The brake system has been designed to carry out the special features of the vehicle. For example, the hydraulic line to the rear brakes has a self-sealing coupling to facilitate unhooking of the front end. By this device it becomes unnecessary to bleed the brake system when replacing a front end unit. The emergency brake works on the rear brake

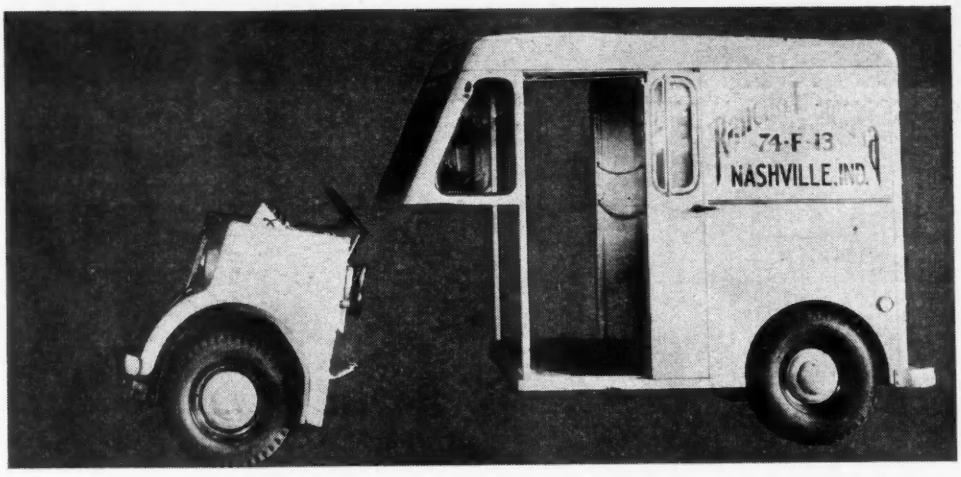
(*Turn to page* 114, *please*)



(Right) Independent rear wheel suspension with two semi-elliptic springs and direct acting type shock absorber.

(Right) Front power unit detached from the body.

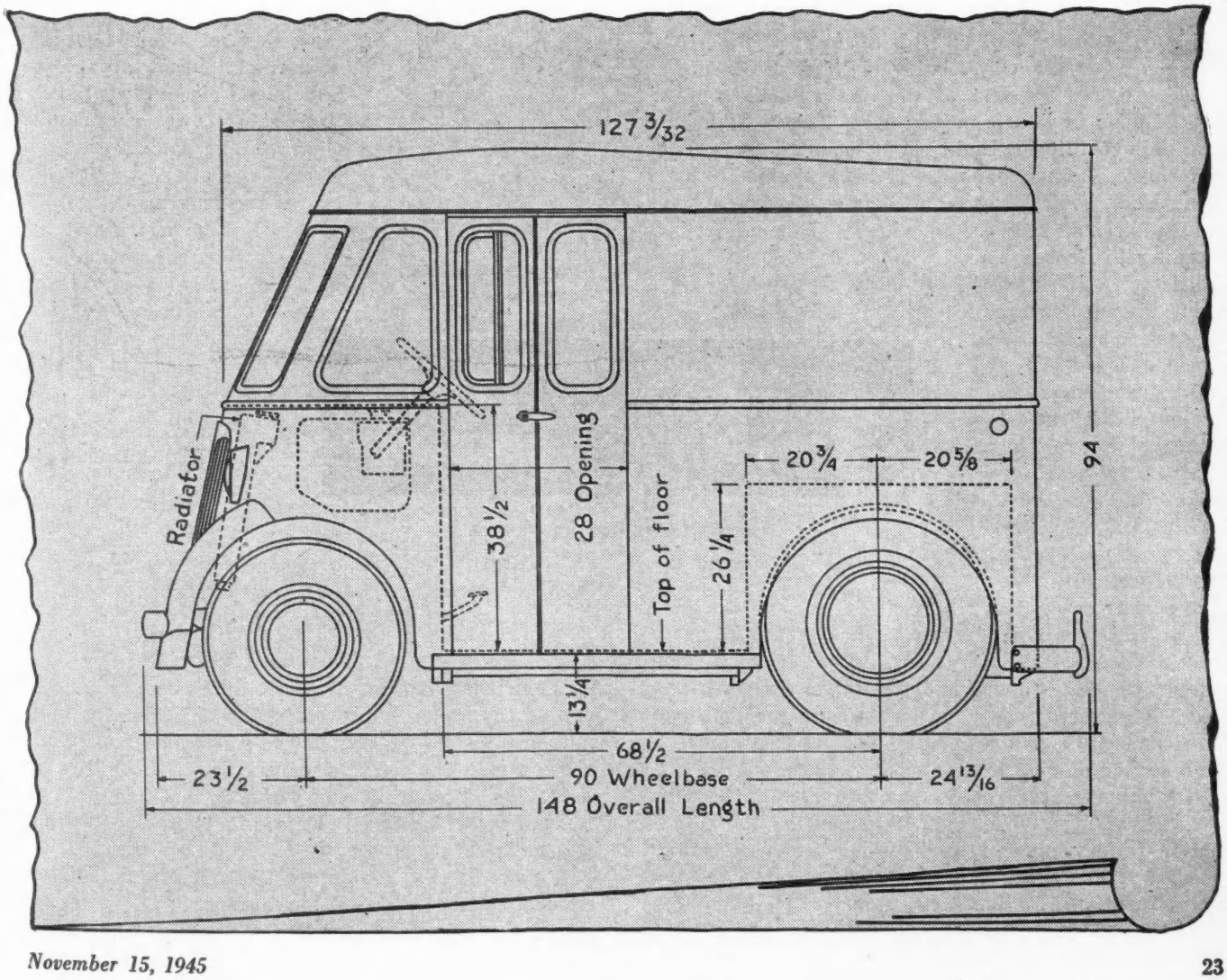
(Left) Rear of front power unit.

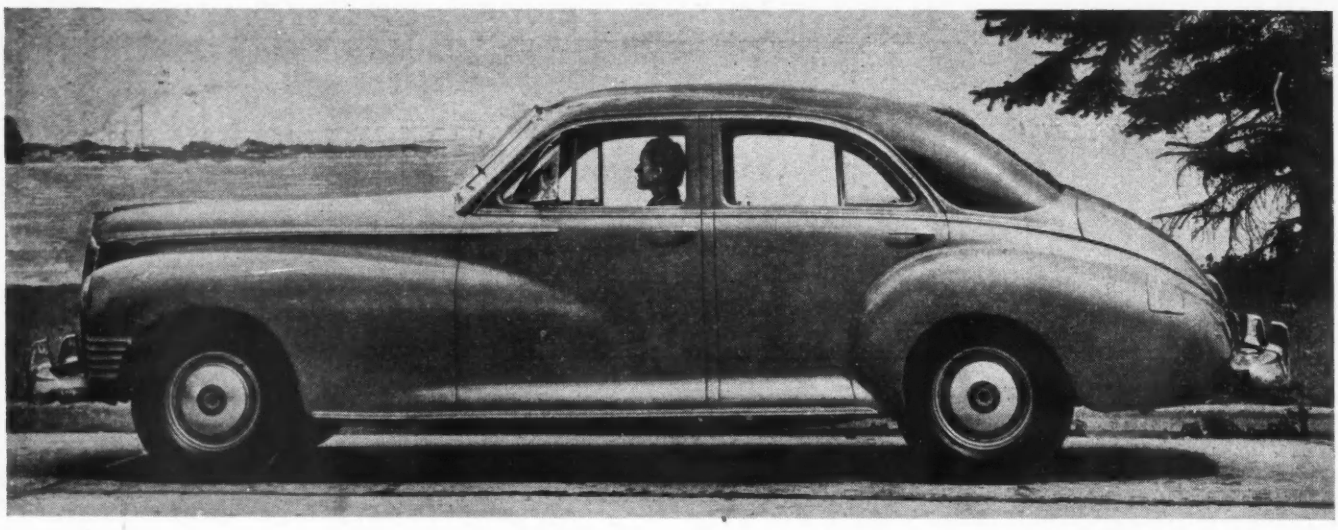


Herrington Delivery Truck

Has Front Drive and Integral Body-Chassis on New Model

Line drawing of Delivr-All truck giving some of the principal dimensions. Others will be found in the specifications at the end of the text.





The new postwar Packard Clipper touring sedan

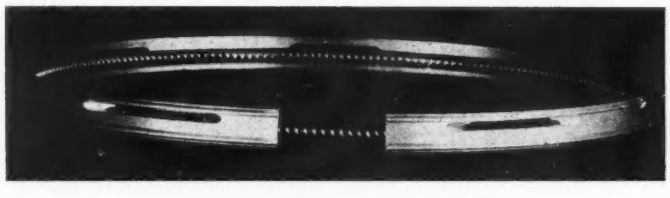
Packard *Adopts Oil Ring with Oil Expander Spring and Sintered Type Bearing for Car Engines*

OWING to the problems of initial production, passenger car output of the Packard Motor Car Co. for the rest of this year will be concentrated upon two basic models—the Clipper Eight and the deLuxe Clipper Eight, both mounted on 120 in. wheelbase chassis. These will be available in four-door sedan bodies only. Full details of other models and additional body styles will be given later. According to George T. Christopher, president, later production will be augmented to include models in four price ranges.

The initial models feature the familiar Packard straight eight engine—8-cyl., in-line, L-head, 3¼ in. bore by 4¼ in. stroke, 282 cu in. displacement, rated 125 hp at 3600 rpm. The engine remains the same in specification details, but incorporates two major features. One is the adoption of the Moraine Div., Durex No. 300 sintered type precision bearing for the main and connecting rod bearings. Bearing coating is a thin section of high lead babbitt.

The other feature marks the first use of the Perfect Circle Type 86 oil ring, representing the culmination of development work dating back to prewar years. It has a coil expander spring instead of the flat formed springs commonly employed. Among the claims for this ring are the following features:

1. Uniform radial pressure distribution through the application of the principle of circumferential expansion. The radial pressure of the ring results from the compression of the long, soft, coil spring.
2. Loss of unit pressure as the ring wears is very low by virtue of the very low spring rate of the coil spring.
3. A very light ring cross section which results in a high degree of flexibility and conformability.
4. Effectiveness, particularly at high speeds, without high unit pressure. Unit pressure is comparable to that of conventional rings without expanders.



Perfect Circle type 86 oil ring

While chassis details remain the same as before, one of the major improvements is the adoption of a new model steering gear of the worm-and-triple-tooth roller type. The roller is mounted on a double row of needle bearings while the worm is mounted on two tapered roller bearings. This unit is said to provide unusual steering ease.

A new die-cast radiator grille and lower radiator emblem enhance outward appearance.

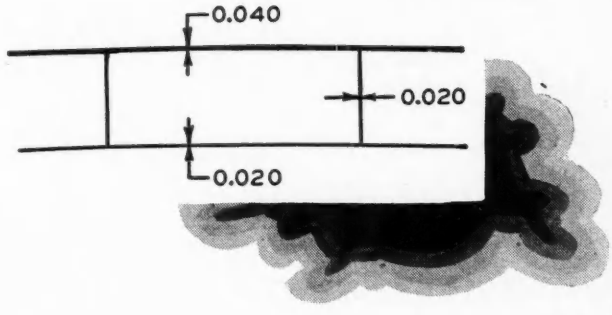
By W. I. Beach
Chief Plastics Engineer
North American Aviation, Inc.

Application of High Strength Plastic to Monocoque Wing Construction

RECENT progress made in the molding of high strength plastics by methods commonly called "low pressure" has significant possibilities for the future production of aircraft. This process is flexible and lends itself readily to the construction of complicated shapes, open or closed, which would be impossible or at least unfeasible economically to duplicate by other methods such as metal fabrication. In addition, the fact that low density core materials can be combined with the faces of high strength reinforced plastics to form sandwich type panels, make the low pressure process extremely useful in the production of aerodynamically clean and lightweight structure so necessary for efficient operation of aircraft. An outstanding example of sandwich type construction is the experimental plastic fuselage for the BT-15 airplane, conceived and built in the aircraft laboratory of the Army Air Forces at Wright Field. (See AUTOMOTIVE AND AVIATION INDUSTRIES, July 1, 1945). When tested the strength-weight ratio of the sandwich type monocoque fuselage was impressively superior to that of the ribbed or reinforced metal fuselage. Also at ultimate failure the plastic specimen showed no disruption of its smooth contour whereas the metal counterpart was noticeably disfigured by deep shear and compression wrinkles.

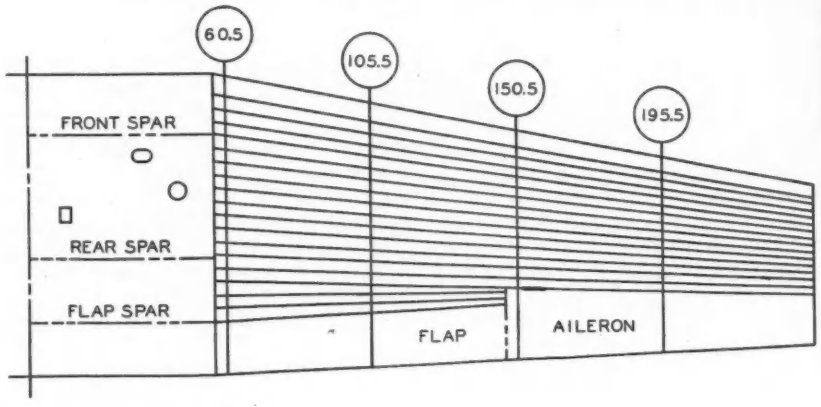
If it were possible to distribute the weight of material in every segment of a structure so as to include just enough sectional area required to support the maximum load action upon it at the design condition, airplanes could be built far more efficiently than they are today. For example, let us compare the stressed skin structure typical of thin metal semi-monocoque wings and that of a pure plastic monocoque wing. Insofar as the plastic wing is concerned, it is to be a pure monocoque body. There are to be no stringers, stiffeners, ribs and auxiliary spars. It is assumed that the vertical shear is carried by the leading edge and a small percentage by the false spar or flap and aileron attachment spar. This assumption is consistent with good design since several flying airplanes have been built having wings minus outer panel spars. To provide skin stiffness and, therefore, a true and constant airfoil contour at all conditions of flight, a sandwich type structure will be employed. The sandwich section will possess enough material to resist normal and torsional shear stresses and all bending stresses. A further purpose of a plastic monocoque wing will be to save weight and offer production advantages over that of the stressed skin semi-monocoque metal wing. To accomplish this, the plastic material will need to have strength comparable to that of aluminum alloy. Tensile and compression values of resin impregnated Fiberglas lamination vary between 44,000 and 54,000 psi depending upon the type of cloth and resin used. Tensile values of 100,000 psi have been obtained with uni-directional Fiberglas. On the other hand, 24ST aluminum is good for 60,000 psi in ultimate tension and compression. However, flexure values of between 60,000 and 80,000 psi are greater for the plastic material than 45,000 psi which corresponds to the average allowable for 24ST aluminum.

Fig. 1—Cross section of proposed tubular type monocoque wing.



Again it is to be noticed that the modulus of elasticity of aluminum is 10 million whereas that for the glass reinforced plastic is around 2.0 to 2.5 million. In some instances values of five million have been reported for reinforced plastic material. Several properties not noted here are allowable bearing and shear values. The average bearing and shear are known to be approximately 30,000 and 15,000 psi respectively. These are considerably lower than those given for the aluminum alloys which are 90,000 and 33,000 psi for the same properties. The discrepancies in the relative strength of the two materials are of no disadvantage to a sandwich type structure; for unlike metals, plastic sheet material can be laminated in a tapering section, thus

Fig. 2—Plan view of outer wing panel indicating the number of tubes and outer skin gages at four stations.



utilizing the effective efficiency of the sheet. Unlike metals, a core comprising low density substance may be combined with high strength plastic facing sheets to produce a greater moment of inertia than is possible to obtain with a stiffened metal panel for the same weight per unit length of span. These factors contribute to the realization of a pure monocoque shaped shell.

In the preliminary design of a plastic wing in which a sandwich type structure is concerned one of the most important factors to be considered is the mutual support of the core and facing materials. To develop the ultimate material strength of the facing sheet in edgewise compression every unsupported segment needs to be restrained to prevent elastic instabiilty or buckling. For this purpose, a lightweight, synthetic core material is sandwiched between the outer faces of high strength plastic sheets. The structural efficiency of this type assembly depends entirely upon the properties of the core. The most critical properties are compression, tension and shear rigidity. Normally, the exposed surface of a wing is subjected to air loads which tend to load the skin in tension or compression according to the position of the wing in various flight conditions. Hence, with a sandwich type structure the bond between the face and core in tension must be sufficient to distribute load normal to the surface to either face sheet. Furthermore, column load introduced into the structure parallel to the faces, due to bending deflections, should not cause local compression failures in the core before the face material is fully loaded to its ultimate design load. And finally, the transfer of horizontal shear loads from one face to another should be accomplished without shear deformation or failure of the core.

Thus, keeping these criteria in mind, a wing design comprising a cored multi-tubular type shell is proposed in lieu of a typical metal wing in an effort to show the advantages inherent in a low pressure molded plastic structure, namely, reduction of weight, manhours and tooling. To make a direct comparison between a stressed skin, reinforced metal body and a sandwich type monocoque plastic counterpart, the outer wing panel of the North American AT-6 trainer will serve as an interesting example. Another reason why in this case it is pertinent to select the AT-6 wing as a specimen is primarily due to the fact that vast amounts of data accumulated in the form of stress and test reports are available. This particular wing has been constructed of aluminum, wood, magnesium and steel for purposes of experimentation.

Much thought and work have been given to low density materials. Probably the first attempt to incorporate lightweight substances between faces of high strength materials was done with balsa wood or related products. In certain instances balsa wood cores have been considered quite satisfactory. The British have been very successful with wood fiber cores. In this country various attempts have been made from time to time to use balsa in the construction of monocoque and semi-monocoque structures. But on the whole, the consensus is that the moisture absorption properties of balsa is detrimental to the general over-all dimensional stability of a sandwich class of structure. As a result, the trend is definitely toward a resinous expanded or foamed product or a mechanically constructed honeycombed

Table I—Data for calculating weight per unit length of span of plastic wing.

Station	t_o	t_i	t_w	Depth of Core	Circle Outside	Circle Inside	Number of Webs	Average Circle Core	Weight of Outer Skin	Weight of Inner Skin	Weight of Core	Weight of Webs	Total Weight in Span lb. per in.
60.5	0.040	0.020	0.020	1.50	155.0	140.0	30	148.0	0.4040	0.1820	0.6450	0.0585	1.29
105.5	0.035	0.020	0.020	1.25	135.0	126.5	30	130.8	0.3080	0.1645	0.4750	0.0486	0.9961
150.5	0.030	0.020	0.020	1.00	110.3	104.0	30	107.2	0.2150	0.1350	0.3100	0.0390	0.6990
195.5	0.025	0.020	0.020	.75	89.5	83.25	25	86.4	0.1480	0.1080	0.1880	0.0245	0.4685

t_o = outside skin thickness. t_i = inside skin thickness. t_w = web thickness.

or webbed system having equal or better strength properties, lower specific gravity and dimensionally more stable than balsa wood. In this connection foamed thermoplastics and thermosetting resins have been made weighing less than three lb per cu ft and yet able to resist a surprising amount of compression and tension loads. A recent experiment with a foamed polyester modified styrene resin produced samples weighing between six and seven lb per cu ft that withstood a compression load of 125 psi before slight crushing of the section occurred. Hence, the availability of strong lightweight core materials suitable for efficient sandwich construction are no longer a matter of conjecture. There are some already deemed satisfactory, based upon the findings of experimentation and test data. But as far as is known at this time, exhaustive or conclusive data are not available. So in view of the incompleteness of knowledge and data concerning these materials, a lightweight core having a specific gravity of 0.08 or density of five lb per cu ft will be selected for the following design of a plastic monocoque wing.

First of all a design proposing the construction of a finished article must have as its basis, manufacturing practicability. Especially must it offer more advantages than other manufacturing if it is intended to secure a satisfactory reception for immediate or future adoption. The plastic wing offers this advantage. It is estimated that the manhours expended in the fabrication of a conventional wing is approximately 1000 to 3000 depending upon the size and complexity of design. The low pressure molding of a plastic wing can be achieved in substantially less than 1000 man hr. It would not be beyond the realm of possibility to build the subject plastic wing in less than 100 man hr. In Fig. 1 is shown a cross sectional view of what may be considered a practical and efficient design of a tubular type monocoque wing which functions structurally without the benefit of spars, ribs and stringers. From the standpoint of production, the tooling and method necessary to laminate or mold a wing as shown are not as difficult as appear upon the surface. Utilizing the bag molding principle characteristic of the low pressure molding process, the plastic wing can be shaped in one complete operation and upon and in one set of molds.

This is particularly advantageous since it reduces the number of tools and assembly jigs necessary to the accurate assembly of component parts. In this case a vented mandrel piped for compressed air is to be incased in a rubber blanket. Layers of impregnated glass fabric are laminated around the pressure mandrel and covered completely by a female mold. It would be practical to cast the female mold in sections of such a material as Kirksite and then bolted and sealed in the upper and lower halves of the exterior mold. The mandrel could be wood, Masonite or any cheap material readily machined to the desired shape. To clarify the complete operation, it might not be amiss if a step by step procedure were outlined. Referring again to the sectional wing view, Fig. 1, it is to be noticed that the inner skin of each tube segment is 0.020 in. thick. The vertical webs, of which there are more in the upper surface than the lower, are also 0.020 in. thick. The outer skin, however, is 0.040 in. thick. A Fiberglas cloth of ECC-128 classification is approximately 0.010 in. thick when impregnated with a convenient low viscosity resin. One complete wrap of the rubber covered mandrel produces one-half of the inner skin thickness. A light core material of 5.0 lb per cu ft is machined and tapered spanwise to the inside of the tube dimensions as shown. The cores are also individually wrapped spanwise with one layer of ECC-128 impregnated cloth and located in their respective position on the covered mandrel. Then two layers of the same cloth are wrapped over the whole assembly to give the gage of surfaces and vertical webs described above. The final operation consists of covering the assembly with the mold halves which are heated by electrical elements referred to as strip heaters, clamping in an air tight closed position and internal pressure exerted by means of air valves connected to the mandrel; upon curing to the desired state the mold is open and the tapered mandrel extracted from the open end of the wing panel.

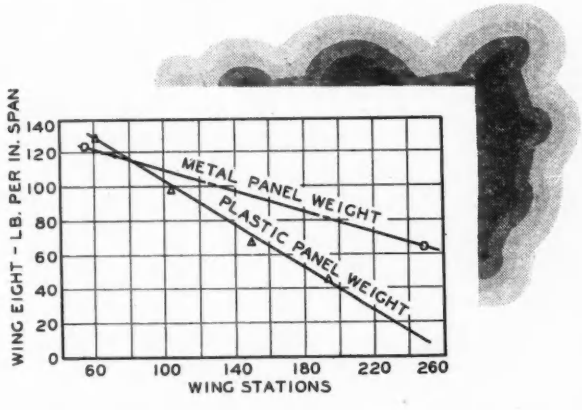


Fig. 3—Relative unit weight of metal and plastic wing panels.

It was mentioned in an earlier part of this article that the leading edge of the wing was structurally strong enough to carry the normal shear load. This is true. However, the individual vertical web of each adjacent tube is capable and will transmit shear load spanwise to the wing joint. And inasmuch as approximately 70 per cent of the total lift of a wing is obtained on the upper surface there are more webs in this surface than is to be found in the underneath side. Hence, stress analysis based upon the stated conditions was prepared to determine the feasibility of such a design from the standpoint of strength and weight. Fig. 2 presents a plan view of the outer wing panel on which are noted the number of tubes and outer skin gages at four stations selected for purpose of analysis.

Examination of the bending stresses discloses a maximum compression stress of 30,834 psi in the upper surface and 30,391 psi tension stress in the lower surface at station 60.5. According to the ultimate flexural

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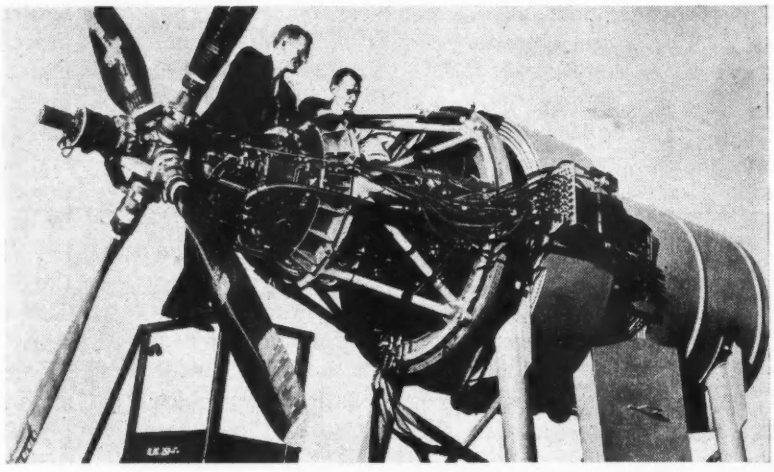
New Airplane Power Plant

Combines Propeller and Jet Propulsion



Propjet on test stand at General Electric's Schenectady Works.

THE illustrations on this page show the new G-E Propjet, a combination propeller-jet propulsion gas turbine that has been under development by the Army Air Forces and General Electric Co. Designed primarily to drive large high-speed military transports and bombers, it has been subjected to rigid test stand runs and in June of this year was installed in an experimental Army Air Forces plane of advanced design.

The gas turbine with propeller is designed for installation in the wings of multi-engined aircraft or in the nose of a single-engine plane. The air rams into the nose of the Propjet through ducts opening forward. This air is compressed by axial flow units in the forward part of the engine and then forced into combustion chambers. There fuel is injected and burns intensely. This raises the temperature and velocity of the gases, which then strike the buckets of the turbine wheel.

The turbine powers the compressor and through reduction gears drives the propeller. Reactive thrust created by the energy remaining in the gases passing through the turbine wheel and discharging rearward is utilized in jet propulsion. Planes powered by these new gas turbines may not reach the extreme high speeds attained by the newest AAF fighter, the jet-propelled Lockheed P-80, which flies faster than any other plane in the air today. On propeller driven aircraft, the propeller blades spinning at high speed are the first part of the plane to be affected by the compressibility barrier. The P-80, being jet propelled and having no propeller, has eliminated the problem and permitted top plane speeds closer to the compressibility wall now limiting speeds of our fastest planes. However, engineers are of the opinion that while the new Propjet type of gas turbine may not

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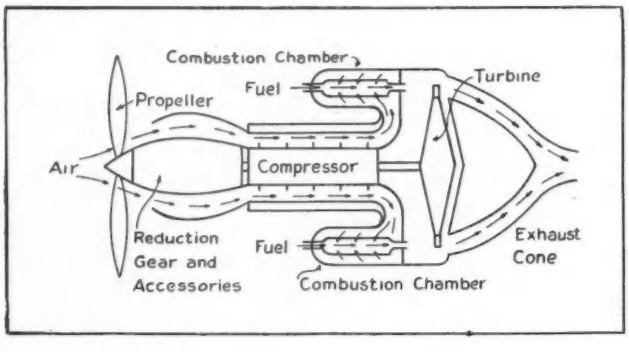
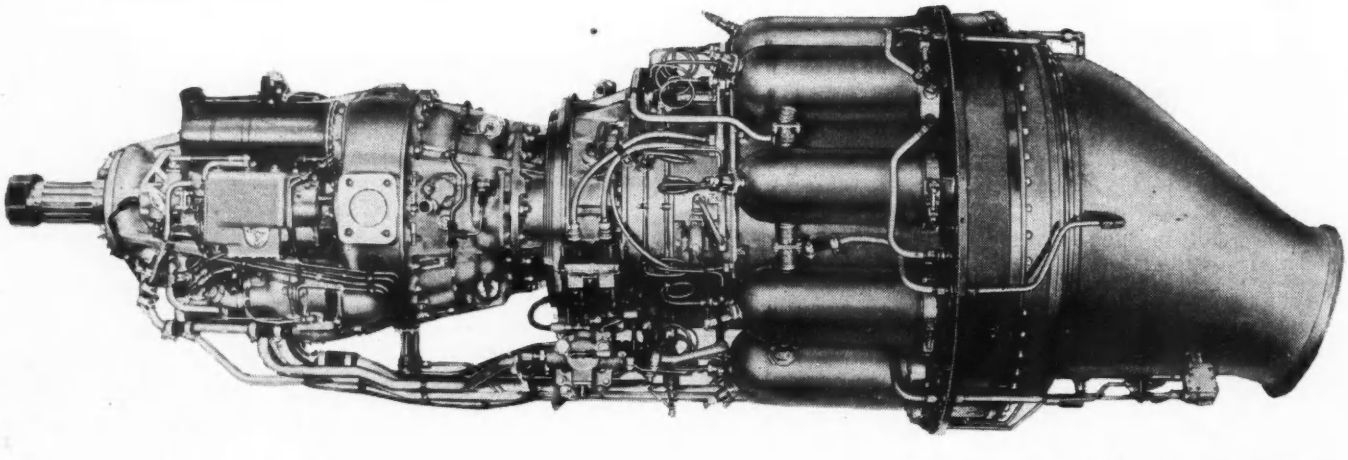
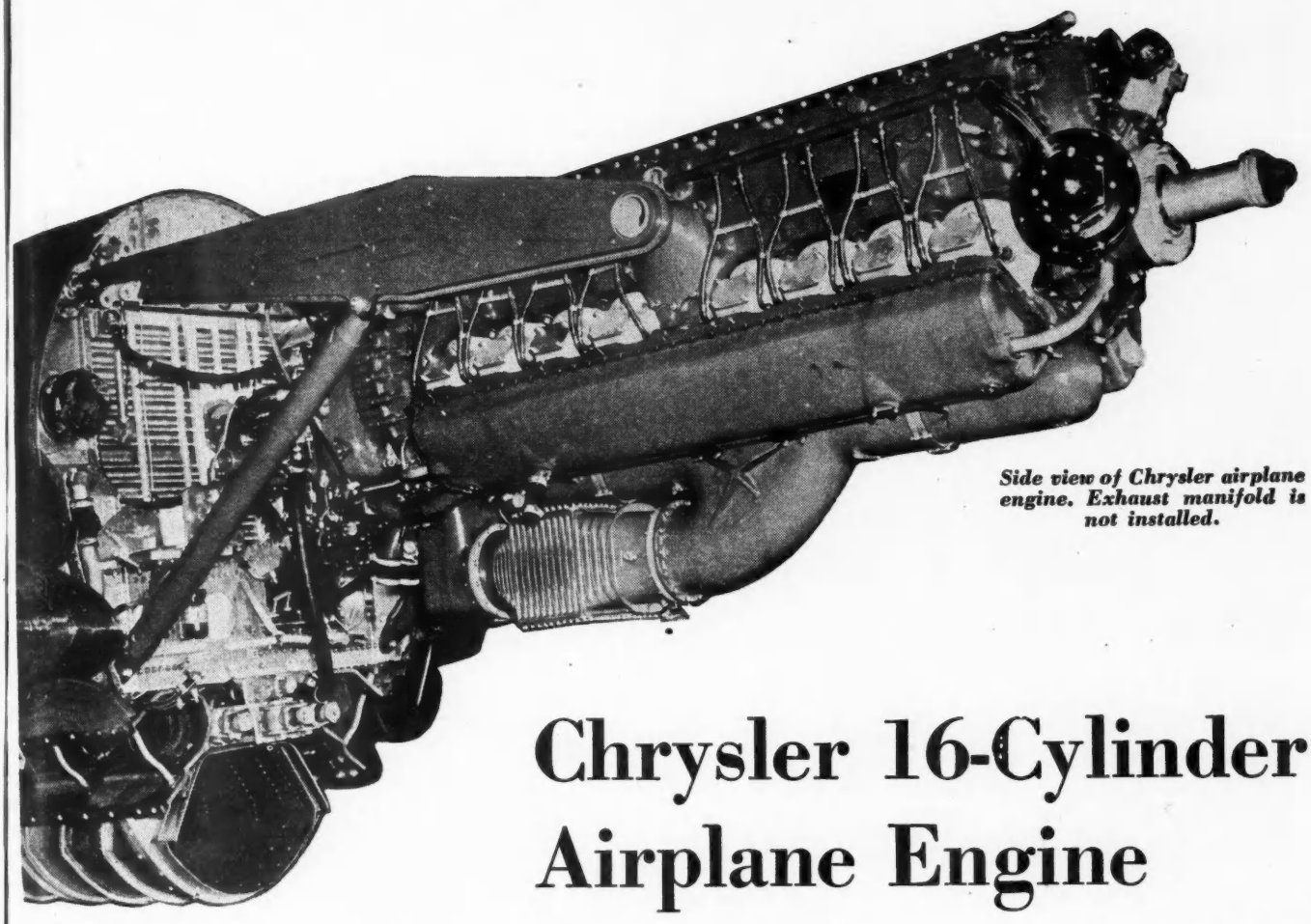


(Left) Schematic drawing of Propjet cycle.

(Below) Port side view of gas turbine (Type TG-100, machine 1730) combining propeller and jet propulsion.



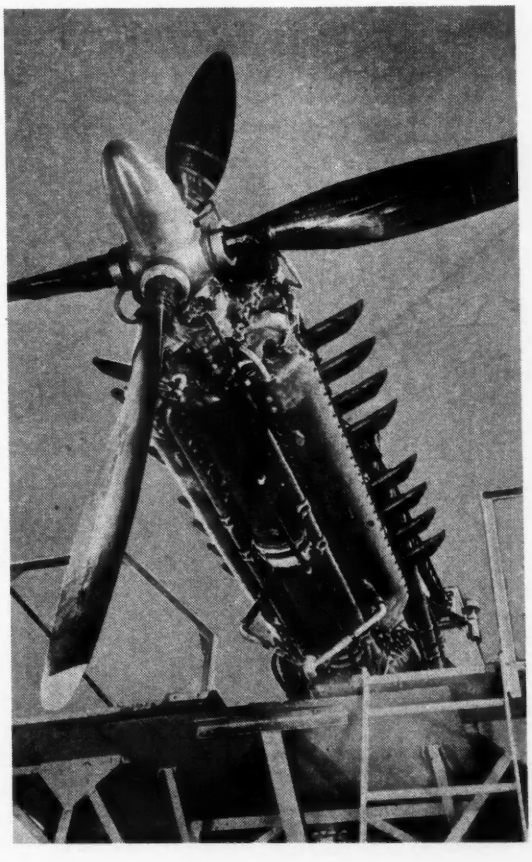


Side view of Chrysler airplane engine. Exhaust manifold is not installed.

Chrysler 16-Cylinder Airplane Engine

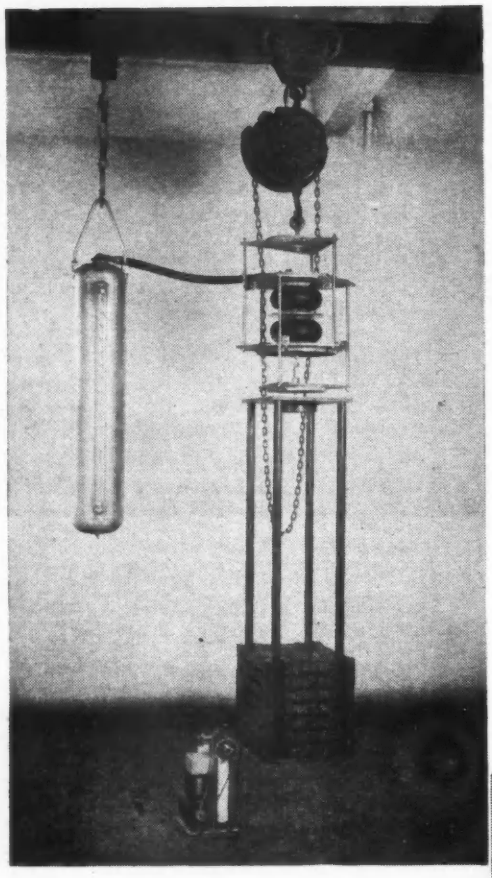
Rated at 2500 h.p. Weighs 2430 lb.

Underside view of engine on test stand at the Chrysler aircraft engineering laboratory in Detroit.



SOME details of the 2500 hp airplane engine designed and built by the Chrysler Corp. for the Army Air Forces have been released, including a statement on its power output to the effect that it is more powerful than any engine of similar displacement. The engine is a liquid-cooled, 16-cyl inverted V type, weighs 2430 lb, is 10.42 ft in length and 33.5 in. in diameter. Major features of this engine are its small frontal area, a two-piece crankshaft bolted together at the reduction gear pinion, two valves per cylinder, one-piece crankcase, a single large ring nut and washer to fasten the cylinder and barrel to the crankcase, and accessories and fittings located in accessible places to simplify production and servicing.

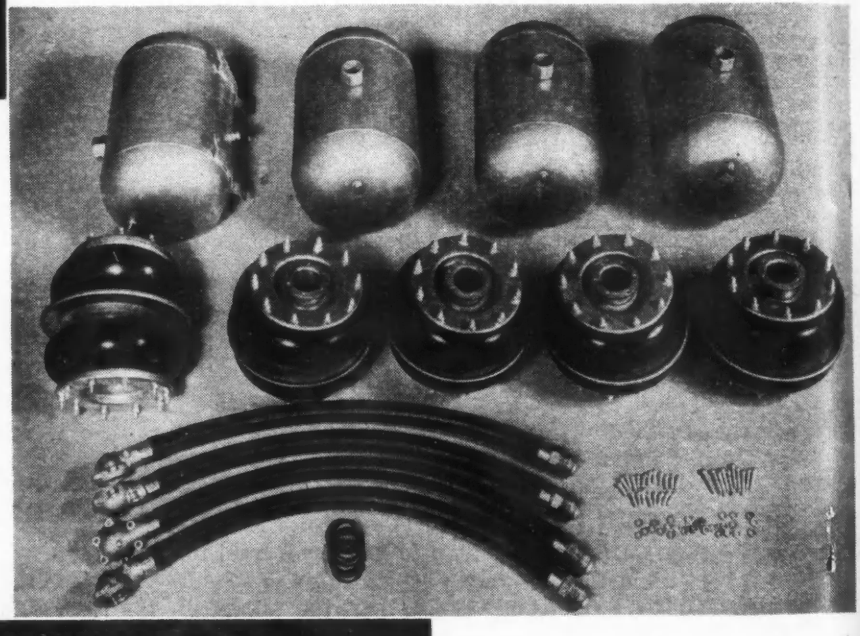
The first engine was delivered to the Air Technical Service Command in January, 1945, its development extending over 56 months from the designing boards to the finished product. In the period from May, 1940, when design studies began, a total of 312 designers, engineers and technicians conceived and produced more than 1100 different parts for the engine. With it installed in a redesigned P-47H fighter plane, flight tests up to 30,000 ft and approaching 500 mph have been conducted at Evansville, Ind., by test pilots of the Republic Aircraft Corp.



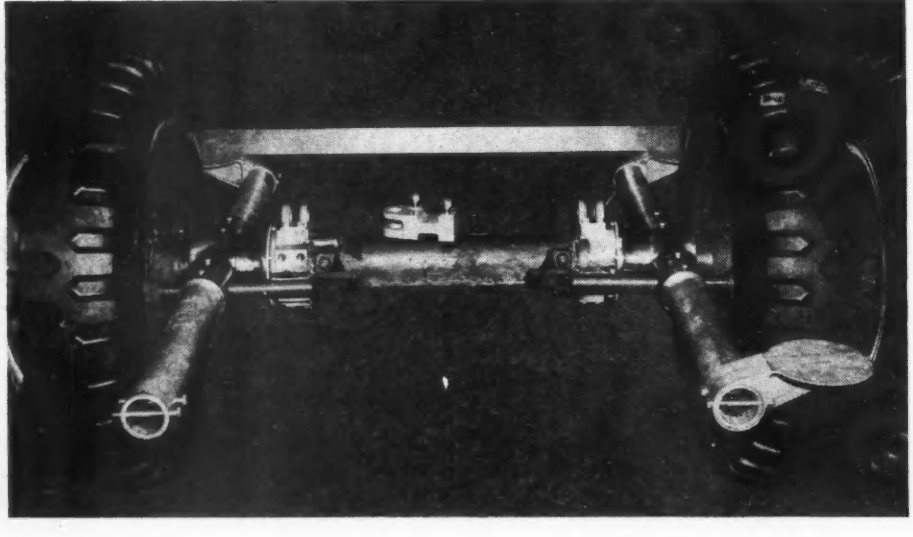
Army refrigerated semi-trailer with integral body and chassis.

FAIRCHILD Engine and Airplane Corp. has disclosed the design details of a new lightweight, refrigerated semi-trailer with an all-aluminum body that was delivered to the Army last November and has since been thoroughly tested at Camp Lee, Petersburg, Va. Intended primarily for transporting frozen meat and C-rations, this experimental trailer weighs 7118 lb, but has virtually the same cubic capacity as the 14,700 lb refrigerated trailer now used as standard equipment by the Army.

Attached to an Army truck tractor, it easily fulfilled the speed requirement of "50 mph over good roads" and passed test runs over the "torture course" at Camp Lee's proving grounds, one of which was with a 6000 lb overload. It has an unusually low center of gravity. Internal temperature can be maintained at 10 F when the outdoor temperature is 120 F. The thermostat is usually set at 10 for 35 F. (*Turn to page* 88, *please*)

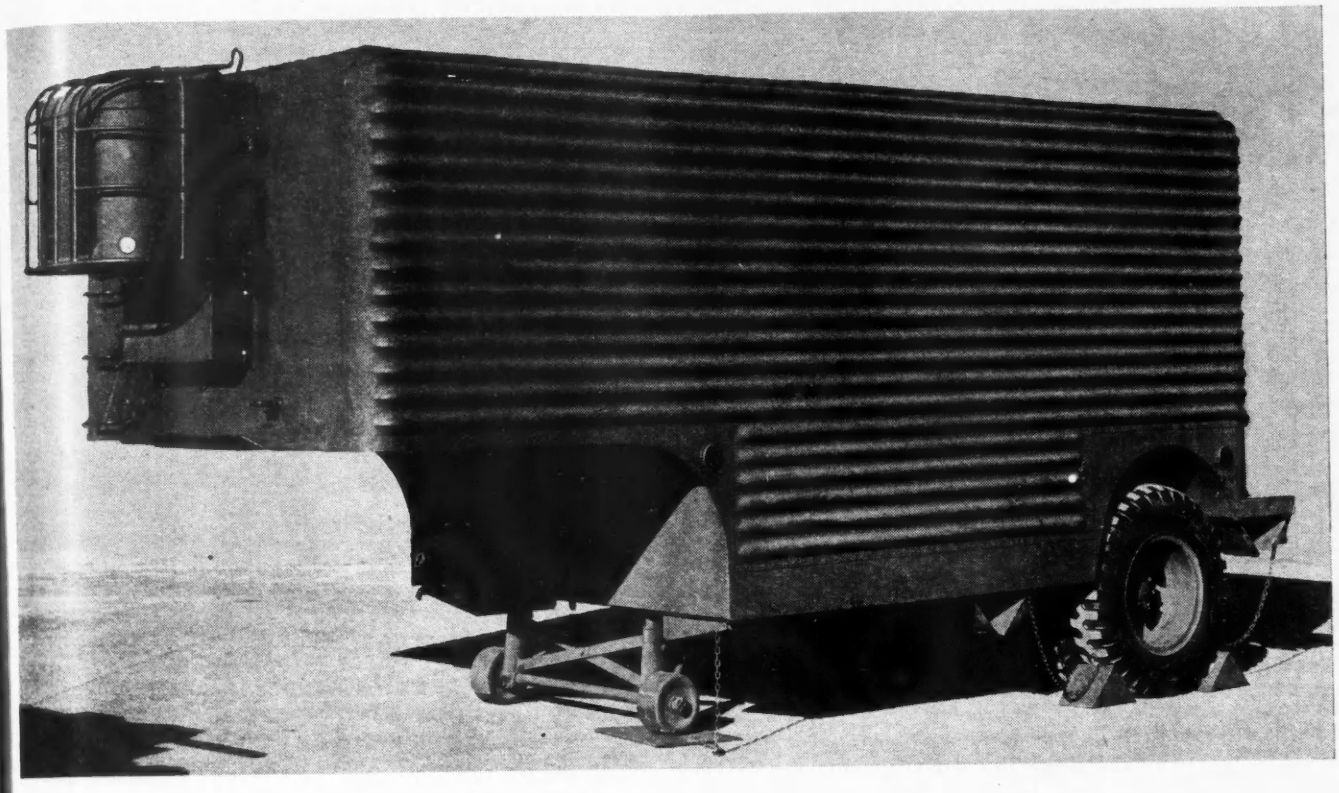


(Above) A Firestone air spring being subjected to test in the research laboratory. An overload hos been placed upon a small air spring. The tank at the left holds the compressed air against which the rubberized fabric bellows works. The machine on the floor keeps the load in continuous action. In a test the bellows withstood successfully eight million 2 in. deformations under a 25 per cent overload.



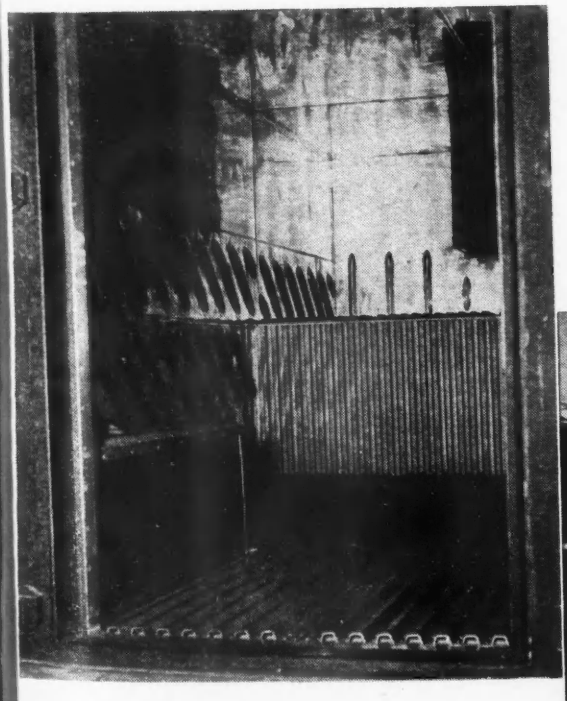
(Above) Firestone air spring assembly similar to that used in the suspension system of the refrigerated trailer. The installation consists of four duplex air springs, four compression tanks and hose attachments for each.

(Left) Timken axle with longitudinal beams and pads at their ends for supporting air springs. The one pad was left off for this picture.

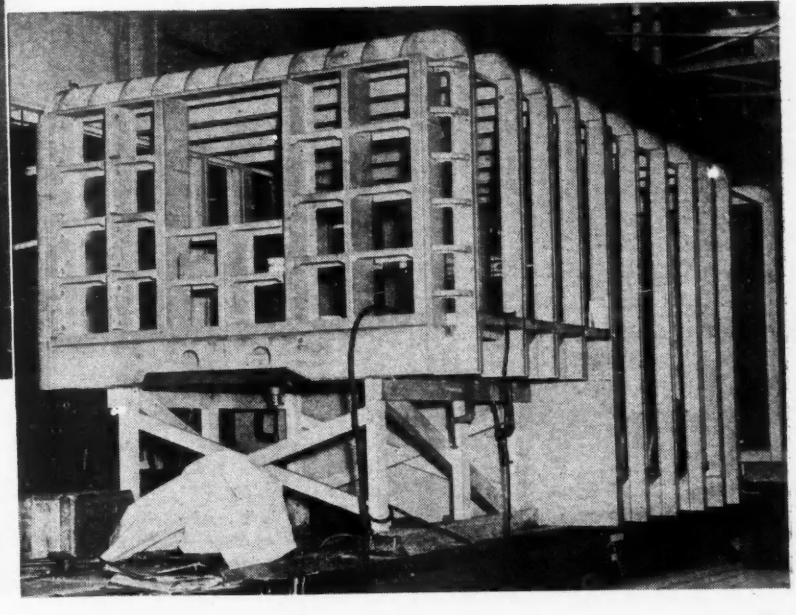


Stressed Aluminum Body

and Air Springs among Weight Saving Features of Fairchild Semi-Trailer



(Above) Interior view of refrigerator looking through door in rear of trailer. Corrugated floor and diagonal beading along side walls permit recirculation of cold air around cargo.



(Right) Aluminum framework of experimental trailer.

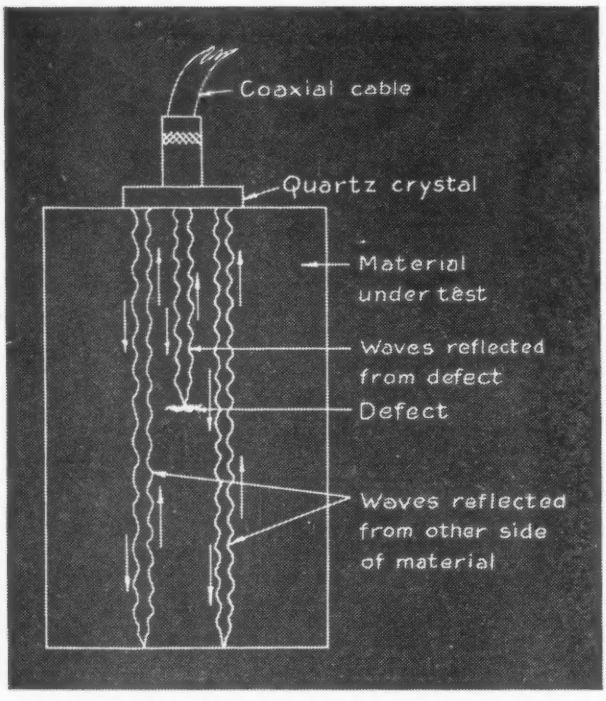


Fig. 1. Principle of operation of the Supersonic Reflectoscope.

Inspecting

By John C. Smack

Sperry Products, Inc.
(Hoboken, N. J.)

THROUGH the use of supersonic waves an entirely new field of inspection has been inaugurated whereby defects in the interior of metals and other materials may now be located by means of this non-destructive test method. It is the purpose of this article to describe the principle of operation of the Supersonic Reflectoscope and the manner in which it has been applied to the inspection of forged flanged type axles at the Peoria, Ill., plant of R. G. Le Tourneau, Inc. Briefly the principle of operation of the Reflectoscope is as follows:

A very high frequency supersonic wave is projected into the material under test and defects in the material such as cracks, ruptures, inclusions, voids, etc., are located by means of the supersonic waves that are reflected back to the starting point from these defects (see Fig. 1). A quartz crystal mounted in a suitable holder, the searching unit, is pressed against and slowly moved over the surface of the piece under test. The surface, which should be reasonably smooth without irregularities, is covered with a film of oil to insure maximum transmission of the supersonic waves.

The Reflectoscope is tuned to the selected frequency (from 0.5 to 12 megacycles available) and electrical oscillations at this frequency are impressed on the crystal, causing it to vibrate and thereby radiate sound waves in the form of a beam into the material under inspection. These sound vibrations are transmitted into the material for durations of only a few microseconds and at intervals, of 60 times per second. For the remaining time in each interval, the crystal, acting as a receiver, picks up the reflected vibrations and transforms them into electrical impulses that are amplified and impressed on the screen of a nine-in. cathode ray oscilloscope.

The oscilloscope screen is provided with an adjustable scanning line that times the reflected pulses and can be calibrated in inches, multiples of inches or feet from the testing surface, depending on the thickness of the piece under test. The initial pulse and any reflected pulses are indicated by peaking of the scanning line as clearly shown by the typical Reflectogram in Fig. 2. Thus the oscilloscope screen provides a quick visual indication of any defects in the materials and their distance from the surface. In general, any mechanical discontinuity in a material will, within the limits of the instrument, reflect some of the supersonic waves and resulting indications will be visible on the oscilloscope screen. The depth of penetration of the supersonic waves varies with the material. In the metals, lead is the hardest to penetrate, and steel, aluminum and magnesium the easiest to penetrate. Steel and aluminum pieces as long as 10 ft have been successfully inspected with the Reflectoscope.

The flanged type axles that are tested at the Le Tourneau plant are mostly of the size and type shown in Fig. 3A. One of the powerful Tournapull earth moving machines on which these axles are used is

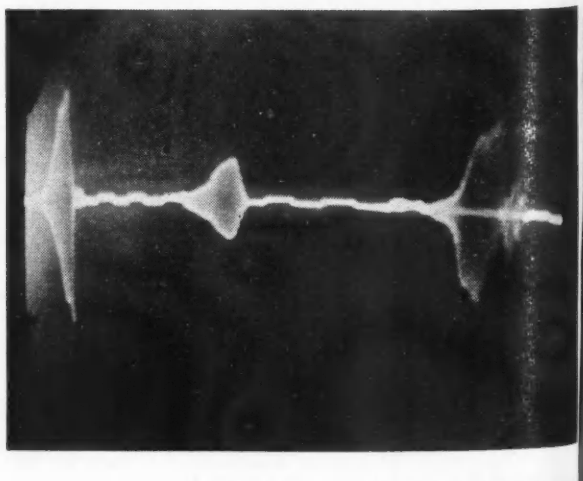


Fig. 2. The indication at the extreme left is the initial pulse and at the extreme right the reflection from the opposite side. A typical indication of a defect is shown in the center.

Forged Axles

at the Le Tourneau Plant by Means of

Supersonic Waves

illustrated in Fig. 3B. These axles, received in the forged state, are normalized before testing. Although these axles could be tested as received, better penetration and inspection is obtained after normalizing. This is due mainly to the larger grain structure which is present before normalizing, preventing suitable penetration except at the lowest frequencies.

After normalizing, the axles are smoothed off in the center of the flanged end with a small hand disk grinder (Fig. 4). The surface should be flat and reasonably smooth, but does not need to be polished. As can be seen, suitable racks are provided for holding the axles in an inverted position for grinding and testing with the Reflectoscope.

The operator, after setting up the instrument and checking its operation on a standard block or test piece, proceeds with routine testing as shown in Fig. 5. The testing surface on the axle is covered with oil and the searching unit is pressed against the surface and moved slowly back and forth across it. In this case inspection of the axle and not the flange is desired. Therefore, the area to cleaned and tested is the center portion for a diameter of about 5¼ in. This is the diameter of the main portion of the axle. As the searching unit is slowly moved over this area, the operator watches for indications on the oscilloscope of sound waves reflected from defects. If no defects are present he will see the reflected pulse from the other end of the axle, a distance of 17¼ in. and also reflections from the shoulder, which is 4⅞ in. from the other end, when the searching unit is passed over that part of the surface above the shoulder. Three

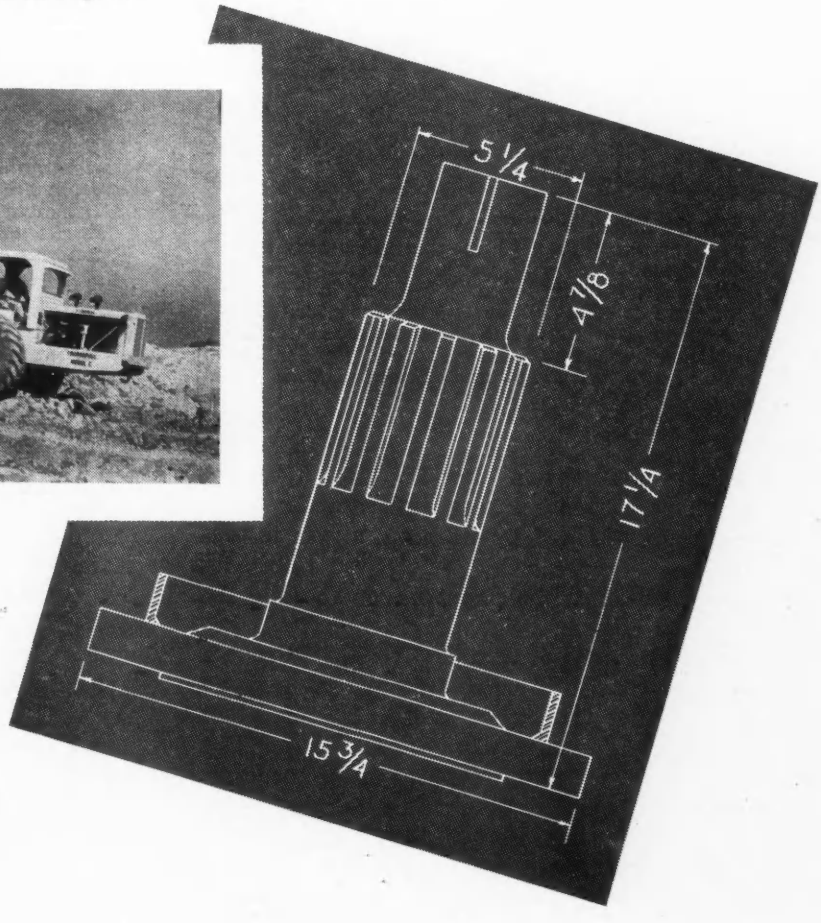


Fig. 3A. (Right) Size of the finishel forged steel axles tested at Le Tourneau.

Fig. 3B. (Left) In the foreground a Le Tourneau Super C Tournapull and Le Tourneau Carryall Scraper, the type of equipment in which the axles are used.

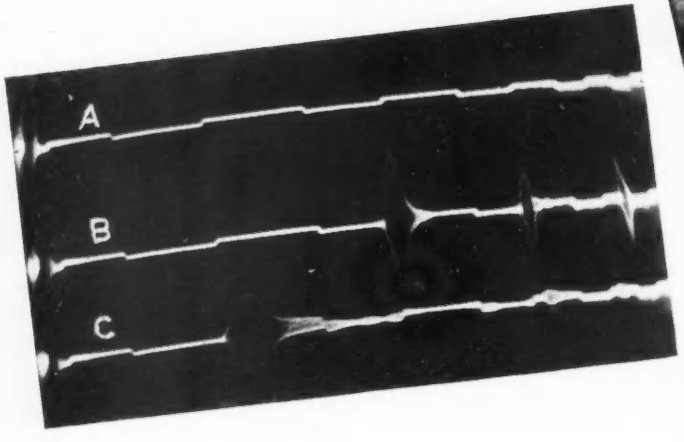


Fig. 4. (Upper left) Center of axles being smoothed with disk sander preparatory to Reflectoscope testing.

Fig. 5. (Upper right) Operator testing axles with Reflectoscope.

Fig. 6 (Lower left) Three Reflectograms taken on the same film. (A) Scanning line only without pulse. Each full wave represents four in. (B) Same scanning line with indications of reflections as obtained on test axle. Peaked indication at extreme left is initial pulse, the center pulse the reflection from a drilled hole, 1/16 in. diam., two in. deep, and nine in. from the flanged end. The next pulse reflections from the shoulder and the last pulse the reflection from the other end. (C) Reflectogram of defective axle showing defect indication of a crack at about 5½ in. from the surface with only small amount of supersonic waves reflected from other defects, shoulder and other end.

Fig. 7. (Lower right) Photographing oscilloscope screen while holding searching unit in place on axle.

Reflectograms are shown in Fig. 6. (*Above.*)

A very simple means has been devised at Le Tourneau for photographing the oscilloscope screen to provide a permanent record when defects have been located. A steel rack for holding the camera (Fig. 7) in proper focus is made to fit over the top of the Reflectoscope. The camera, a four by five Speed Graphic with f4.7 lens, has an adjustable front that may be raised or lowered to throw the image or scanning line to any desired position on the film so that three or five exposures of the oscilloscope screen can be made on the same film for purposes of comparison. Exposure time is one second using Eastman Super XX cut film.

These Reflectograms are only taken when there are indications of defects, in which case the photograph provides a permanent record for each rejected axle. Further checks can be made when convenient and the axle can be sectioned and etched to check the extent of the defect, an example of which is presented in Fig. 8. After a representative number of defects are located, the Reflectograms and sectioned samples are used to set up definite testing standards. Of the many types of defects located in these axles through the use of supersonic waves, the principal defects found have been shrinkage cracks, stringers, piping, segregations, inclusions, and flakes. Some of these defects are shown in the photographs of sectioned axles, Figs. 9 to 11.

Many axles that had been assembled in Tournapulls before adaption of the supersonic test were later suc-

cessfully tested from the ends of the axles without disassembling.

Most metals, glass and many plastics and other materials can be inspected with supersonics for internal defects. Any defect that is a mechanical discontinuity will reflect the sound waves and a corresponding pulse will appear on the oscilloscope screen. Of course, reflections also occur from the opposite side and any other surfaces such as shoulders, key seats, drilled holes, etc. Reflections from these surfaces can be easily identified by measuring their distance from the inspection surface and comparing these distances with those indicated for the reflected pulses on the screen.

The Supersonic Reflectoscope can also be used to solve difficult inspection problems such as detecting laminations in plate, poor bond in bonded metals and discontinuities in welds of certain types. Although no definite claims are made for detecting defects at distances greater than 10 ft, there have been successful tests on shafts as long as 20 ft.

The actual limitations of the Supersonic Reflectoscope are not as yet known, as the depth of penetration and size of defect detectable depends on the following factors which require careful consideration on each different application:

1. Kind and type of metal to be inspected. (Brass, aluminum, steel, etc.)
2. Method of fabrication. (Cast, forged, rolled, etc.)
3. Surface conditions. (Rough, smooth, wavy, etc.)
4. Grain structure. (Large or small grain size.)
5. Length or depth of piece to be inspected (up to 10 ft).
6. Approximate minimum size and type of defects to be located. (Flaking, inclusions, cracks, voids, etc.)

Each testing application involves the detection of certain types of defects. By variation of the supersonic testing frequency, the size of the crystal searching unit and the sensitivity setting it is possible to locate certain types and sizes of defects and disregard others. For example, a one megacycle frequency and one in. square searching unit is generally used for detecting relatively large defects in large pieces up to 10 ft

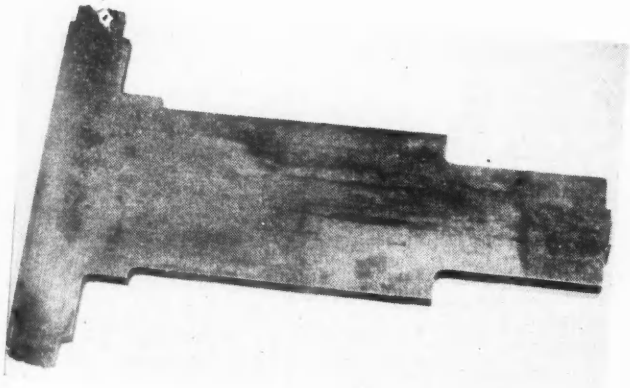
(*Turn to page* 124, *please*)

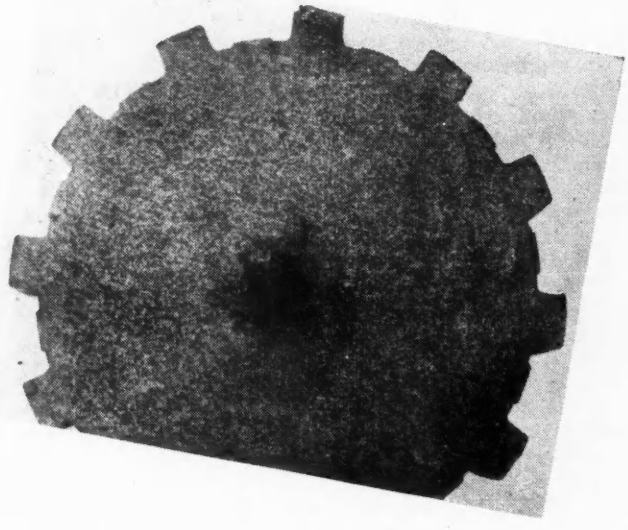
Fig. 8. (Upper left) A longitudinal slab from the center of a rejected axle, etched to show cracks and segregation in center as detected by Reflectoscope.

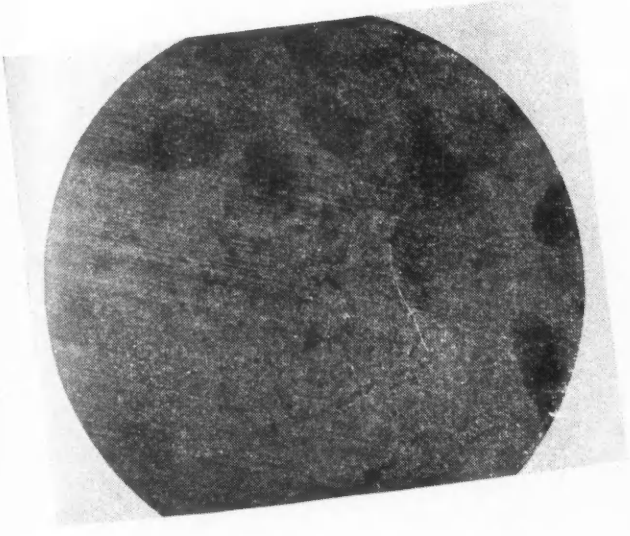
Fig. 9 (Upper right) Piping and large crack in center.

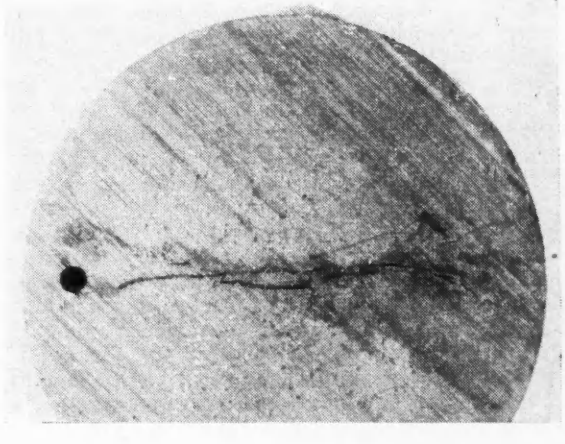
Fig. 10 (Lower left) Large stringer, slight flaking and piping in center.

Fig. 11. (Lower right) Large longitudinal cracks.









Why GM

Rejected claims of Government Agencies on 25 per cent wage increases

In a brief submitted by the General Motors Corp. during the current wage negotiations with the UAW-CIO union, the company makes an analysis of the recent reports made public by the Office of War Mobilization and Reconversion and by the Department of Commerce to the effect that industry can pay a wage increase of approximately 25 per cent. General Motors disputes the assumptions and conclusions of the two Government agencies. The GM statement in part is presented herewith:

Among exhibits which the Union submitted supporting its case for a 30 per cent wage increase was a newspaper dispatch regarding an anonymous memorandum apparently prepared by some statisticians in the Office of War Mobilization and Reconversion. Subsequently the memorandum referred to was made public. The conclusion reached by the authors of this memorandum was that on the assumed level of gross national product for 1946 of $160 billion economies in operating cost which will result from a return to peacetime production on a 40-hour week and the repeal of the excess profits tax will result in a sufficient increase in net profits after taxes to permit an increase of 24 per cent in wage rates without reducing industrial profits below a "satisfactory" level as compared with 1941. This OWMR memorandum is one of those pseudo-scientific hypothetical constructions which have recently been so popular with a certain school of political economists. It is not based on facts or knowledge but on assumptions and deductions, all of which are open to serious question.

The assumption is made that what is called the gross national product will be $160 billion. The gross national product is a concept over which statisticians dispute as to how it shall be measured, and over which economists wrangle as to what it means. Whatever may be its meaning or importance, no one could possibly tell what it will be in 1946 unless he knew what the general price level would be (which no one can know) and even then a correct forecast would only be a lucky guess, no mater how much it might be fortified by charts and algebraic formulae.

Profits of all corporations plus taxes paid on those profits are forecast at $17 billion. Never in time of peace have profits plus profit taxes exceeded 8.66 per cent of the national gross product, according to the official computations. That would be $13.9 billion if the gross product is $160 billion. Various other methods of analysis give estimates of $12.0 billion to $14.3 billion for the maximum amount of profits plus taxes corresponding to a gross product of $160 billion. The method used by the OWMR statisticians is not described.

Similarly various methods of analysis indicate that the maximum of profits plus taxes of manufacturing corporations corresponding to a gross national product of $160 billion in time of peace would be between $9.3 billions and $9.9 billions. The OWMR memorandum guesses $10.5 billions.

If there are eight million unemployed next spring, as expected by the OWMR, neither profits nor gross product can be high, unless prices are inflated. In 1940 there were less than eight million unemployed on the average, and profits plus taxes were only $8,388,000,000, or 8.65 per cent of the gross national product. With a gross national product of $160 billion this ratio indicates $13.8 billions for all corporate profits plus taxes, and $8.4 billions for manufacturers' profits plus taxes. Conversely, if profits are as high as stated in the OWMR memo, then there cannot be a high volume of unemployment. High profits have always been associated with low unemployment.

Never before 1941 have salaries and wages in the United States been less than 5.78 times corporation profits plus taxes. If, as stated by OWMR, corporation profits plus taxes will be $17 billion in 1946, salaries and wages at present wage rates will be $98 billion, or only 13 per cent less than in 1944, 9 per cent less than in 1945, 5 per cent less than in 1943, and very much higher than in any previous year in our history. The OWMR memo, however, assumes that salaries and wages will only be in the neighborhood of $30 billion, or one-half the gross national product. Such a low proportion of gross national product has rarely been reached.

The OWMR memo assumes great increases in productivity per worker. Such an assumption is based on the experience of war industries operating at unprecedentedly high volume and able to introduce mass production techniques formerly not used in these industries, though well-known in many peacetime industries. The experience of industries that continued to produce the same sorts of goods in war as in peace gives no support to the assumption that productivity per worker in peacetime operations has increased more than slightly. A careful examination of many studies that have been made on this subject shows that the annual rate of increase in productivity in the national economy as a whole has not averaged more than 1.5 per cent per worker since 1923. Higher rates that have been asserted are based either on the omission of large parts of the national economy or on incorrect enumeration of the workers involved, or on inadequate allowance for changes in the purchasing power of money.

The OWMR memo takes for granted that all savings in costs, whether due to increased worker efficiency, increased management skill, improved equipment, or larger-scale operations, should be used to increase wages. Aside from the question of moral claim to savings not caused by the workers' own efforts, it is at least open to question whether the national welfare would not be more advanced by lower prices than by higher wages. Lower prices would benefit the whole nation and would increase the demand for labor, whereas wage increases benefit only those workers who get them and who continue to hold their jobs.

The OWMR memo arrives at the conclusion that a 24 per cent increase in average manufacturing wage rates in 1946 would be offset by reduced costs as follows: Reduction of overtime, 4.5 per cent; Elimination of one-half of incerases in wage other than changes in basic wage rates, 9.5 per cent; Repeal of corporation excess profits tax, 10 per cent.

The OWMR assumption that a reduction of overtime employment will make available an additional margin of profit for all employers equivalent to 4½ per cent of the wage which could then be paid to *all* workers is not valid. This completely ignores the fact that many thousands of workers are now and will continue to work overtime in order to meet production requirements. The country is not faced with a reduc-

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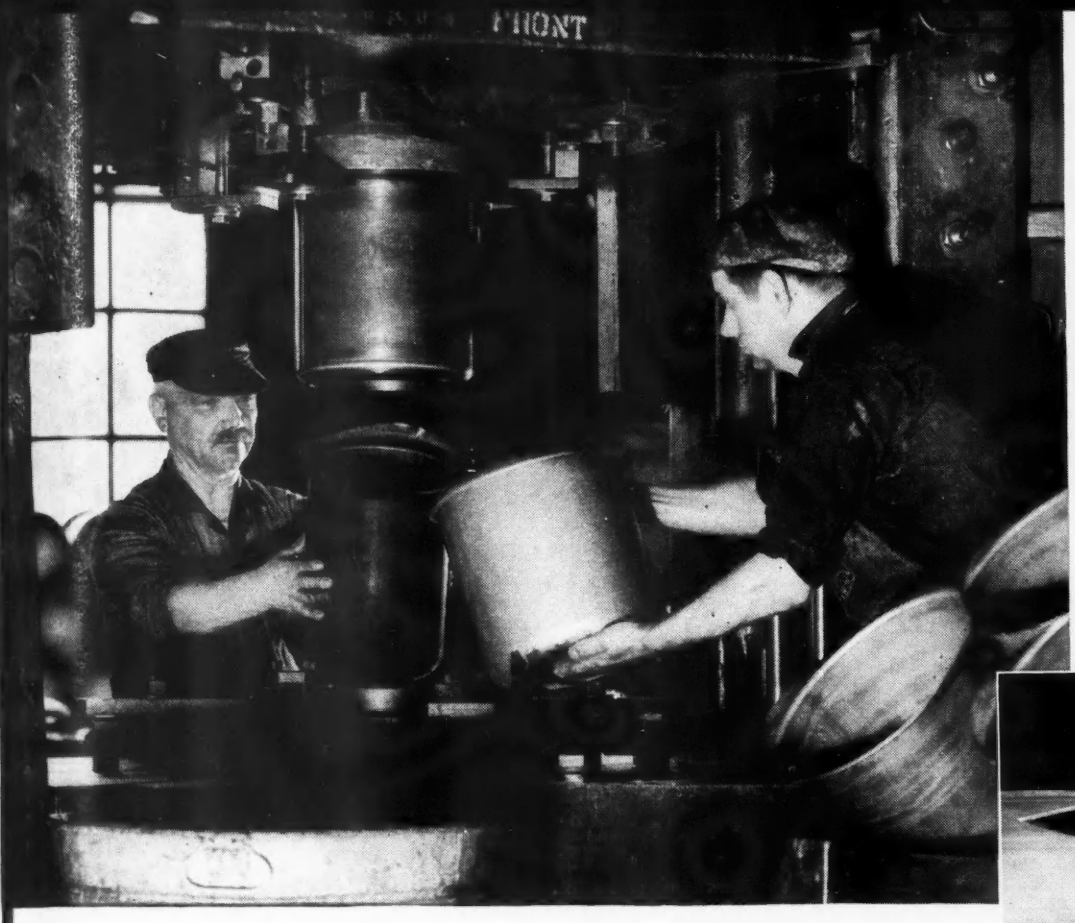
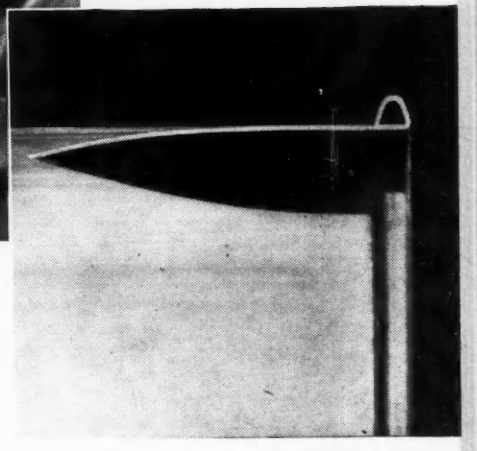


• *On the third draw, the cylinders are formed to 9⅛" diameter by 14½" deep.*

• *Each cylinder is finished with a bead having two 20-degree angles.*



Cylinders . . . Deep Drawn With Uniform Wall Thickness

Here is an achievement in deep drawing—steel cylinders, 9⅛" in diameter by 14½" deep, formed without localized stretching or drawing down of the metal.

The success of this deep drawing job, for which the specifications are unusually severe, results from the skill and ingenuity of the Guyer Metal Products Corporation, Chicago, and the fine and uniform quality of Inland Deep Drawing Cold Rolled Sheets.

The operations start with 20-gage, 24½-in. diameter blanks. Final dimensions are attained on the third draw, the cylinders being straight from top to bottom and with uniform thickness of metal throughout. Then follows another unusual operation. The trimmed edge is turned back to form a bead with two 20 deg. angles.

Thousands of these cylinders have been made of Inland Cold Rolled Sheets, and breakage has been held to the minimum. When you have a deep drawing or severe forming problem, call for an Inland engineer. He will work with you in determining the steel best suited to your product and manufacturing methods.

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Seat cushions found in Dodge trucks — all models — are air-bound, in addition to improved spring construction. The cushion is provided with a manually adjustable air valve which can be positioned by the driver to compensate for his weight or for additional passengers or to resist bouncing on rough roads.

Dodge Announces Changes for Truck Models of ½ to 2 Ton Line

DODGE Division, Chrysler Corp., has released its plans for the resumption of civilian truck production and the utilization of available truck manufacturing capacity, the initial announcement covering the range of models in the ½-ton, 1-ton, 1½-ton, and 2-ton vehicles. Other models are to be announced later. The Dodge line continues many features which have withstood the test of military service and incorporates certain new mechanical features of unusual merit. Among such features common to all models are the following:

1. Greater driver comfort through the development of a new type of seat cushion and seat back, provided with improved spring construction. Distinctive characteristic of the seat cushion is the fact that it is air-bound and fitted with an adjustable air valve to regulate the volume of air. This valve is provided with a manual adjustment so as to permit the driver to vary the rate and softness of the cushion in accordance with passenger load and road conditions.

2. Engine lubrication is improved by the adoption of a new Gerotor type oil pump which is said to double the oil pressure at low engine speeds.

3. With the lifting of restriction on critical materials, cylinder heads gaskets now are of copper instead of steel.

4. Stemming from military truck experience all rear axles are fitted with spring loaded sealing type housing vents which relieve pressure in the housing, but

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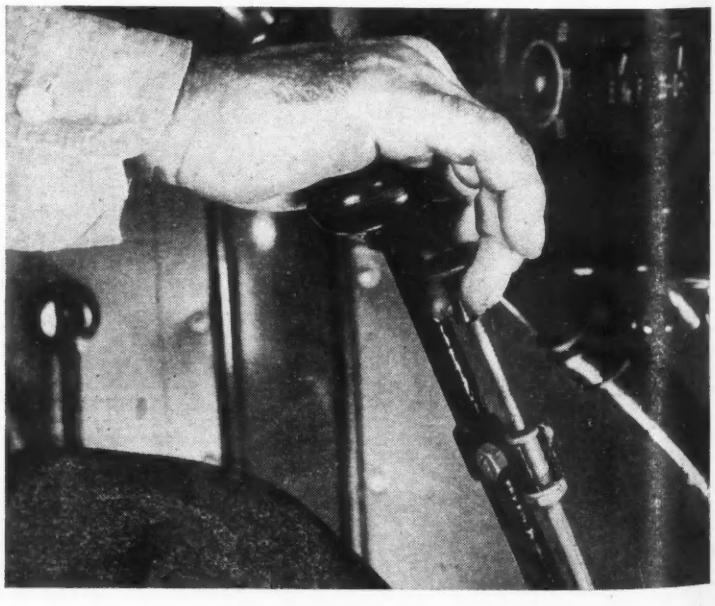
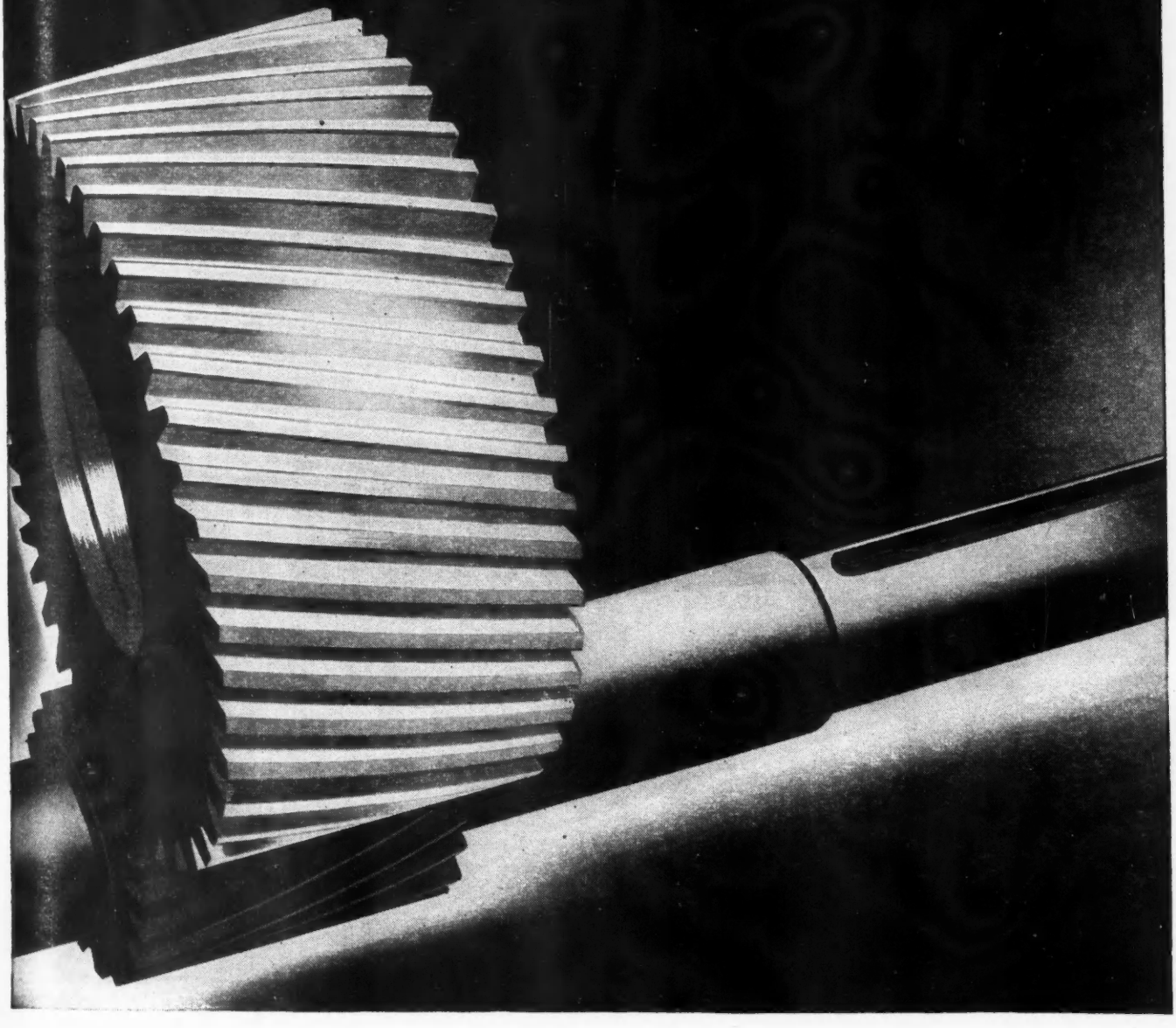


The finger-tip vacuum control for shifting the two-speed Eaton axle used in Dodge dual-purpose truck models. The control is located, as shown, conveniently on the gear shift lever.

Molybdenum gives steel the strength and toughness necessary to make long-lived gears.



CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

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Airbriefs

By Henry Lowe Brownback

Recklessness

I suppose that there is little use trying to make anyone behave who is utterly determined to misbehave! A few years ago America's then outstanding civilian flier was grounded for flying too low over a football game but what he did that day was nothing as compared to the utterly reckless flying of a group of service pilots over the Penn-Navy game on Navy Day in Philadelphia. Even after a series of mishaps that have shocked sections of the nation it seems that those in charge of the services are bound to do nothing to make service pilots obey flight regulations which is little credit to them.

The Cub

I had great pleasure a few days ago in listening to the glowing praise bestowed by a French officer upon the little "Cubs" for their work in spotting in Europe. Truly these little machines have carved a place in history for themselves as has the Jeep. The light plane idea did not originate with Taylor and Piper who made their first planes together, but they got out a fair little ship and went broke trying to sell it commercially. Mr. Piper continued to put time and money into the effort and has succeeded in a big way. Often first attempts fail as many successful men, Mr. Ford included, can testify, but men of faith and vision continue to fight and often turn this failure into success.

Complication

Anyone who carefully studied the cutaway view of the British multi-row, radial, sleeve valve engine recently published in AUTOMOTIVE AND AVIATION INDUSTRIES can get a clear idea of just what high power output means in the way of complication. One can make cylinders just so big before things begin to happen so we must use lots of them and this entails the mass of rods, gears, shafts, etc., which the illustration shows. The designing and construction of such an engine is a tribute to the engineering and manufacturing skill of man and when one considers that the cases which carry and hold in line all of this mass of mechanism must change shape and dimensions when heated and it all continues to operate, one gets the strongest possible argument for a simple gas turbine to replace it. Our planes and engines are performing marvels. Our transport planes are running like trains and ships in spite of the fact that this mass of machinery, the failure of one little part of which may mean disaster, must be built and serviced in a manner which makes watch building and repairing a crude proceeding. Simpler mechanisms will cut cost tremendously and still further reduce the possibility of failure.

Strikes

The whole country is plagued with a series of strikes and threats of strikes which are not only hindering reconversion but are seriously affecting values of securities throughout the nation. These strikes are going to crush the aircraft industry if current wage demands are coupled with artificial curbs on production. I do not believe that the average worker has any conception what it is all about or knows anything further than the union leader's promise that if he falls in line he will get more money. If the unions can only hold their grip by getting wage increases at regular periods then we might as well have a national crisis now and get it out of our system. Security prices cannot rise every day nor can commodity prices. Artificial rises in such prices due to gambling brought on a crisis which brought our industry down to almost nothing in 1930 and uncontrolled demands for wage increases made to keep union leaders in power can do the same thing again. The stock market is strictly supervised both by its governors and by the Government to prevent a runaway in stock prices and unless labor can supervise itself to prevent a runaway in wages and consequent inflation it will find itself as strictly supervised which will be just one more nail driven into the already well-nailed-down coffin of liberty and opportunity for success in our or any other business.

Higher Speeds

As I write the press is flashing news of something which flies at twice the speed of sound and the British announce a fighter plane with service speeds of 540 mph. These higher speeds make us realize how small the earth is becoming and why, unless men of faith and understanding can kick out the present group of squabbling politicians who are selfishly ruling labor, management and governments, and take over internal and international affairs on a basis of mutual faith and understanding based upon true Christian principles instead of a creed of "I demand," the very machines which should bring us plenty are going to destroy us.

Military Aviation

The possibilities of winning wars by airplanes alone have been the bone of contention in military circles for years. In this war the airplane achieved its greatest success as a disruptor of transportation, proving that it could break up every known transportation service. Its range of action was limited to the point where naval and ground military forces had to win ground with the aid of the air forces in order to get flying fields within range of targets. Until the atomic bomb was perfected the destruction wrought by the airplane, while great, was not a deciding factor, but today with the airplane of very long range capable of doing tremendous damage with a very light bomb load, things have changed greatly and the airplane alone might prove far more effective than it was at the beginning of the war. It behooves us to try and develop some means of energizing the disintegration apparatus of the bomb material either from the ground or from radio controlled interceptor planes at distances far enough away to prevent its destroying us before one or more of the new crop of aggressors gets ready to start to dominate the world.

Exit the Silent Knight

Some years ago the "Silent Knight" double sleeve valve motor made automotive history. In late years all of the builders of these engines have turned to the poppet valve save Panhard in France which company has built some remarkable sleeve valved engines. I have just received official word from France that Panhard has finally abandoned the sleeve valve engine for overhead poppet valves.

Liberty

The only way that air transport can really serve mankind is through complete freedom of the air! After the Civil War we found ourselves bested by the British on the seas but, nevertheless, we maintained the principles of the freedom of the seas and of the seaports of the world. Today we lead in air transport and our friends whose very land, goods and souls we have

(*Turn to page* 56, *please*)

INSURANCE AGAINST

- ASSEMBLY COMPLAINTS
- OIL LEAKS
- COMPRESSION LOSS
- WATER SEEPAGE
- CORROSION
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Why not make sure that all assemblies are leakproof and pressure tight?

No oil leaks . . . No water seepage . . . No compression losses. Form-A-Gasket holds tight against gasoline, kerosene, lubricating oil, grease, fuel oil, cold or hot water, salt water and anti-freeze.

Keep the "come backs" away from your door . . . Use Permatex Form-A-Gasket!

Form-A-Gasket No. 1 is a paste that dries fast and sets hard.

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Output of Cars Increasing Despite Labor's Threats

Manufacturers Going Ahead with Plans to Get into Full Production Although They May Soon Be Closed by Strikes

Despite the storm clouds of labor strife gathering ominously on the horizon, production of automobiles is picking up rapidly at all companies which have started production. Apparently, the manufacturers are going ahead with plans to get into full production as soon as humanly possible, just as though there were not the very imminent possibility that they may be closed by strikes if they do not agree to wage demands of organized labor. One company spokesman says his concern is hoping at least to get samples of its 1946 models into the hands of dealers before the strike breaks. Others say they believe the wage situation may be compromised and strikes avoided.

Ford Motor Co. leads the field in production, with 9000 cars completed by the end of October. This gave each dealer at least one car, although no sales could be made because ceiling prices had not yet been set. The company has a schedule of 25,000 cars during November, which figures out to more than 1000 per day. If no serious labor trouble develops to hold up steady acceleration, Ford expects to be turning out between 5000 and 6000 cars per day by next June and to hit the postwar peak of 8000 per day by the summer of 1947, when new facilities are available. Branch plants which also are assembling cars are at Buffalo, N. Y.; Edgewater, N. J.; Dallas, Texas, and Louisville, Ky. In addition, truck production is underway at Somerville, Mass.; Chester, Pa., and Richmond, Cal. The Chicago branch is expected to get underway soon. Truck production at the beginning of this month was in excess of 600 per day, and will climb steadily.

All General Motors divisions are coming along fast, with Chevrolet, last to announce its 1946 models, putting on a public showing Nov. 3, indicating that all dealers have been supplied. Chrysler Corporation is the only company not yet publicly in the field with 1946 models at the end of October. A company spokesman stated recently that none of the divisions would announce its product until uninterrupted production can be assured. It is known, however, that Dodge division has been turning out a few cars per day for the past few weeks and it is assumed that other divisions are doing likewise. Although it was announced a few weeks ago that production of Plymouths would not start until around the end of the year, observers who toured the plant Oct. 20 were told that production would start within a couple of weeks. Assembly lines already had been installed and other reconversion work was nearing completion. It is very likely that some dealers already have at least one car, although there is no official verification of this.

Nash, Hudson and Packard all are in production and undoubtedly have completed dealers sampling or will do so this month. Studebaker has been closed by a suppliers strike, but will go again soon. All companies still are beset by shortages of components, particularly in such items as grilles, bumpers, and other body accessories purchased from outside suppliers. The labor situation among suppliers has cleared up somewhat for the moment, but with wage demands still an unsettled issue in the parts field, strikes are expected to crop out sporadically as a nuisance, if not an outright hindrance.

Gray iron castings are likely to present a serious problem when production of cars hits volume proportions. The castings industry is currently squirming on a three-pointed dilemma—increased labor costs, a low price ceil-

(*Turn to page* 90, *please*)

Metal Market Facing Crucial Period as Strike Vote Nears

Few Signs of the Approaching Crisis Are Apparent. With the Exception of Sheet and Strip Steel, Demand Is Normal

By W. C. Hirsch

With the CIO steel workers' union asking for the taking of a strike vote on Nov. 28, the metal market is heavy with forebodings of the beginning of what may turn out to be the most crucial period in its history. But as for telltales of the approach of the crisis in the market's day-to-day performance they are almost entirely lacking. With the exception of automobile sheets and strip steel, the scramble for which dates from the days before reconversion got under way, finished steel products for the most part move in a routine way without undue pressure on capacity. According to a recent release of the American Iron & Steel Institute, sight must not be lost of the fact that current capacity of the steel industry has been stepped up to a point where a 70 per cent operating rate is equivalent to what was 88 per cent before the war. With this adjustment in mind, the recent rate of steel production will appear as rather normal under prevailing circumstances. How much of the pressure on flat rolling mill capacity stems from the actual needs of automobile and parts manufacturers and how much consists of semi-speculative purchases is the "$64 question" that preoccupies the attention of producers. In order to protect their regular customers, they have been compelled to whittle down the tonnages which they continue to be asked to enter on their order books by any but long established takers of their products. There has been no charge made so far that outsiders have come into the field, the most frequently heard explanation being that ordinarily small buyers have sought to obtain the booking of tonnages far in excess of what their needs are likely to be in the next three months. With the shifts that must be expected in the postwar period, prewar data are, of course, only an approach to the solution of these problems, but with every turn of steel mills' rolling equipment spoken for over the coming year's first quarter, the burden of proof that the ordered material is part of his normal requirements rests with the purchaser. Steel producers are well aware of the increase in stocking of sheets and strip which may upset

(*Turn to page* 119, *please*)

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Chevrolet Line for 1946

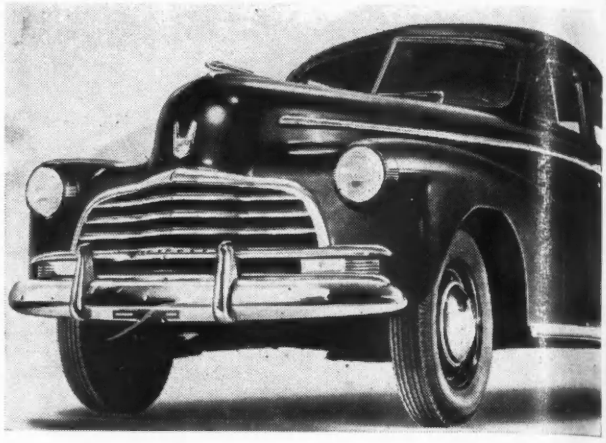
The long-awaited announcement of the Chevrolet line for 1946 was made early this month—highlighting three series of models—the Stylemaster in the lowest price bracket, the Fleetmaster, and the Fleetline. The Stylemaster sport sedan, a four-door model, has been shown in dealer showrooms over the country and is the first model in production. As materials become available and production facilities are further expanded, this series will offer other body types such as town sedans, business coupes, and others. Output of Fleetline and Fleet Master line will follow as soon as conditions permit.

Generally speaking, the mechanical features which proved so successful in the previous model year and during the war are being continued without change. The engine remains the same and continues use of the light-weight cast alloy iron pistons. Axle, knee action, chassis frame and other details remain the same. The vacuum power gear shift is continued as standard equipment on all models.

Front end styling bears the mark of modernity with a new grille treatment, widespread head lamp mounting, and massive front bumper. Generous color options are offered for 1946—a choice of six color schemes for each of the regular models.

Chevrolet Stylemaster

Chevrolet's entry in the low price bracket features new front end design which accentuates massiveness and lowness of line.



PRMG Members Limit Support of Shows

At the annual meeting of the Piston Ring Manufacturers Group, Oct. 23, its members decided that, commencing Jan. 1, 1946, they would exhibit at or support only one national A.S.I.S. show held every other year, and in the alternate year only, and not more than six geographically distributed regional shows sponsored by the Joint Operating Committee of the National Standard Parts Association, Motor Equipment Wholesalers Association, and Motor Equipment Manufacturers Association.

This action was taken because of the possibility of innumerable trade shows throughout the country, resulting in needless duplication of effort and great economic waste.

Cleveland Gets Biggest Truck-Trailer Plant

Fruehauf Trailer Co. will build the world's largest plant devoted to truck-trailers at Avon, Ohio, 21 miles west of Cleveland. The new plant, which will be nearly a half mile long, will not displace present facilities but will augment them. It will be devoted particularly to the quantity production of standard model Fruehauf truck-trailers.

The plant will occupy a 186-acre site at the intersection of Miller and Walker roads. The main manufacturing building will be 2,250 ft long and 400 ft wide, single floor, of the latest type steel and concrete design and construction. In addition, there will be a two-story personnel and cafeteria building and a two-story administration building.

Gradings and footings will be started at once. Construction will begin as soon as steel is available. Fruehauf officials estimate that the plant will be in operation by August, 1946.

An investment of $4½ million will be required for the new plant, including buildings and equipment. It will employ 2,500 when in full operation and the Fruehauf Co. states that it is planned to recruit the necessary operating force from the vicinity of the plant with the exception of a few key executives familiar with Fruehauf methods.

Car Shortage Mounts

Here are some facts on the number of cars that have been junked since 1941, and the number remaining to take care of the nation's automotive transportation needs:

The United States is more than five million automobiles short of the registration figure of 1941, the last full-production model year. R. L. Polk & Co. estimates, based on the latest available registration figures and projections to cover the present, indicate that on Nov. 1, 1945, there were about 5,227,000 fewer cars than were registered on July 1, 1941.

Polk's statisticians last July estimated 3365 cars were going off the roads in the United States daily. This is the figure taken to bring the total loss for the war period up to the present date.

Total United States passenger car automobile registration on July 1, 1941, was 27,700,011, according to Polk, and it was down to 24,114,922 on July 1, 1944. This tabulation, of course, does not touch cars in storage during wartime, the number of those being impossible to check with accuracy.

That company has not reported fully on registration for the 16 months that have elapsed since the mid-year 1944 count, but has produced the recent estimate of a loss of 3365 cars daily. In the early war years such estimates were somewhat higher, as the degree of care motorists would give their old cars was a factor that could not be estimated in projections. Care was better than in normal times, and later estimates have been taking this into consideration.

The passenger car registration as of July 1, 1944, totaling 24,114,000, according to Polk figures, included about 7,500,000 cars, or nearly 1/3 of the total, which were over 7½ years old at that time. At the present time the number of cars over 7½ years old is probably greater and their per cent of total registrations is almost certainly greater than at July 1, 1944. This is because more cars probably moved into the over 7½ year age group in the past year than were lost by that group through scrappage.

There was a stockpile of new cars numbering more than 500,000, that went gradually to essential users after February of 1942, when production ceased. This stock was virtually exhausted by the time of the 1944 registration count. All other cars in use now (except the few 1946 models that have been built) have been in the hands of drivers for three and three-quarter years or more.

Statisticians also anticipate a greater junking rate for the months since gasoline rationing ended, because of increased use of cars, and many believe the Polk July figure of 3365 daily is currently too low.

B-W Plans to Improve And Expand Plants

Borg-Warner Corp. is planning to spend approximately $25 million for reconversion, plant improvement and expansion during the next two years, according to C. S. Davis, president. Business is expected to increase 30 to 35 per cent above prewar levels, he stated, requiring approximately 25 per cent more employees. The Corporation expects to be able to meet all customer demands in automotive, aviation, and agricultural fields by the end of this year.

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NEW acres of factory space, amplified equipment, unparalleled laboratory facilities—all backed with 34 years of successful experience—that's the Sealed Power set-up of today! That's why Sealed Power is offering you now the finest service in all its long history—to help make your good engines even better!

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Courts Asked to Determine Job Rights of Veterans

What is believed to be the first declaratory judgment action taken to determine the relative validity of union and Selective Service interpretations of the Federal act governing re-employment of veterans was recently filed in Federal Court at Detroit by the Carboloy Co., Inc.

According to Selective Service, the Act "compels" the company to re-employ a returned veteran. Unions generally are in conflict with this law in that they claim the eligibility of the veteran should be governed by his "seniority" status. In union contracts with management, "seniority" generally dates from the end of the employee's probationary period after he was hired.

This difference in opinion, which has been plaguing industry ever since passage of the act, was brought to a head by the action of the Carboloy Co. in asking for a Federal Court ruling on the question.

The issue involved in the "test" case is that preference was given a returned veteran over a woman employee who had both been hired originally, for similar work in January of 1943—the woman one day earlier than the man. Subsequently the man left to enter military service. On his discharge from service last December, he was re-employed by the Carboloy Co.

Later, when war contract cancellations made layoffs necessary at the Carboloy plant, the company laid off the woman, retaining the veteran—in line with the Selective Service interpretation of the act.

Recently, the union (UAW-CIO) has notified the company that according to its contract the woman was laid off "illegally"—that the veteran should have been laid off, and that the company was liable for back pay to the woman. The company, officials say, had gone through the entire war period without a strike, manufacturing literally millions of cemented carbide cutting tools for war industries and armor-piercing cores of this same hardest of metals for anti-tank projectiles.

Its harmonious relations with the union are now being threatened, according to company officials, by the varying interpretations of the Veterans' Act, and it has asked the court to determine what its course should be. The seriousness of the problem to the company is emphasized by the fact that its former employees still in the service, and who in all likelihood will request re-employment, represent a total equal to 70 per cent of its entire present payroll.

Similar problems are being faced by countless other manufacturing organizations throughout the country, Carboloy officials state, and might result in serious and widespread labor disturbances, as veterans are rehired in increasing numbers, unless a definite court ruling on the question is issued.

PUBLICATIONS

Jack & Heintz, Inc., has issued a brochure describing its comprehensive line of **electronic gages** and **inspection devices.** Among these devices are, an electric indicator, an electronic comparator, both for external measurements, an electronic indicator for internal or external measurements, an electronic height gage, an electronic internal comparator and two types of automatic ball separator gages.*

A Glossry of Machine Shop Terms has been issued by Kropp Forge Co. It should be of definite practical aid to buyers and users of machined forgings. Words and terms are defined as used in heavy machine shop practice, and recognition is given the fact that other definitions are sometimes employed in various industries for describing identical processes or operations.*

A new edition of Cincinnati Milling and Grinding Machines' **arbor catalog,** Publication M-1424, has been published. Improvements included in the new edition are complete lists of arbor collars; drawings and dimensions of arbor support bushings; spring chucks and collets; dimensional drawings of Nos. 40, 50 and 60 series taper shanks.*

A new 16-page Bulletin No. 26, published by Ajax Electrothermic Corp. describes high-speed, precision melting of non-ferrous metals in **Ajax-Northrup induction furnaces.** Both lift-coil and tilting-coil types of furnaces are illustrated and fully described.*

Kearney & Trecker Products Corp., a subsidiary of Kearney & Trecker Corp., has published a 16-page catalog, CMA 10, on the recently announced **Model C Milwaukee Autometric Boring Machine.** Illustrations and detailed explanations covering outstanding features, operating data, applications and setups, complete accessories lists and specifications are included in the catalog.*

A brochure on the subject of **presses for modern pressure processing** has been prepared by The Hydraulic Press Mfg. Co. It covers briefly the applications of deep drawing presses, single-action presses for coining, straightening and embossing, rubber pad forming presses, stretch forming presses, sheet leveling machines, flat-die forging presses, etc. In addition, descrip-

(*Turn to page* 100, *please*)

Jet-Propelled, Twin Engine Plane Announced

Development of the longest range jet-propelled airplane in the world—a twin engine fighter with speed in excess of 500 mph and which is said to have aerodynamic characteristics suitable for speeds in the sonic range, was announced by Bell Aircraft Corp. with permission of the Air Technical Service Command.

Although the plane, designated the XP-83, is an experimental model and has not been placed in production, it has demonstrated that it is capable of flying to extremely high altitudes, according to ATSC reports, and that one of the faults of early jet planes—shortness of range—has been eliminated.

One of the larger fighter planes of the day, the XP-83 is a medium wing monoplane of semi-monocoque construction with a wing span of 53 ft. The fuselage is 44 ft, 10 in. long and is of all metal construction. The tail, upswept to clear the jet blasts of its General Electric 1-40 engines, is approximately 15 ft, three in. high at the top of the fin. It has a tricycle landing gear.

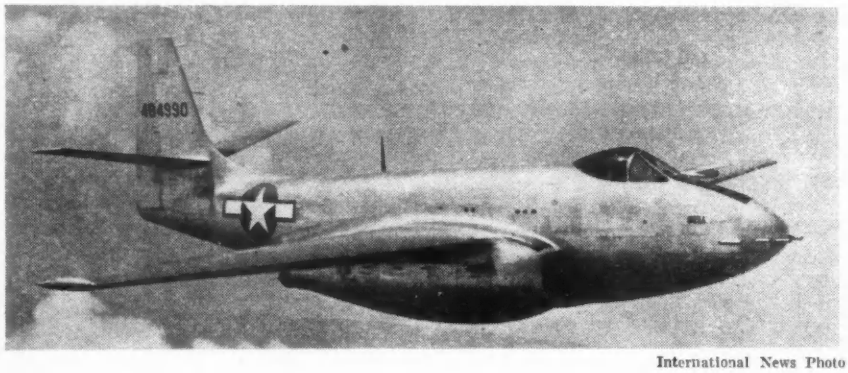
Weight of the plane empty is 15,500 lb while with its full fuel load it weighs more than 27,000 lb.

Armament usually consists of six 50-cal machine guns mounted in the nose, although this can be varied. The plane also can carry a 2,000-lb bomb under each wing.

Looking somewhat like its predecessor, the P-59A Airacomet, the XP-83 has its engines mounted under the wings with the cowlings adjoining the fuselage. These engines, developed by General Electric, and considered the most powerful turbo jet engines made. Like other jet engines, they burn kerosene.

The cockpit, which is unusually large for the cockpit of a fighter plane, is equipped with a bubble canopy, affording excellent vision for the pilot. It has a minimum of control instruments as compared with a conventional plane. It also is like its predecessor, the P-59A Airacomet, in that it is remarkably free from vibration because it has no propellers or conventional gasoline engines. The XP-83, however, is much faster than the Airacomets which are now being used by the Army Air Forces for training purposes.

Bell XP-83 Jet-Propelled Plane



International News Photo

THE PRESENT

THE FUTURE

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THE FUTURE

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To our customers—

A MESSAGE OF APPRECIATION

The wartime demands for zinc in both metal and pigment form were without precedent in the history of the zinc industry. At no time during the war, however, did any military use lack the zinc it required. We are proud of the part which our organization played in the zinc industry's fulfillment of this tremendous wartime program.

Without the splendid cooperation of our customers, however, this record of accomplishment would not have been possible. For this help we are very grateful. With the free exchange of information which resulted from this cooperation we were able to ship a large list of zinc products where and when they were needed most. At the same time, we were able to fulfill all contract obligations.

We earnestly solicit a continuance of this free exchange of information on our mutual problems in the years ahead. The war has taught industry that this type of cooperation can offer many advantages. The better we understand our customers' problems—and they ours—the better we can serve them with materials which will perform most efficiently in their ultimate uses (see panel at the left).

The New Jersey Zinc Company looks forward to the coming years with confidence that continued cooperation between our customers and ourselves in the many fields we serve, or in which we may be called upon to serve, will enable us to operate to the mutual advantage of all concerned.

THE NEW JERSEY ZINC COMPANY

160 Front St., New York 7, N. Y.

HORSE HEAD PRODUCTS
New Jersey zinc

PERSONALS

Recent Appointments Among Automotive and Aviation Manufacturers:

Ford Motor Co., **J. R. Davis** and **H. L. Moekle**, elected Directors; **M. L. Bricker**, Vice-Pres. in chg. of Mfg. and **C. L. Martindale**, Controller.

White Motor Co., **P. C. Williams**, Director, Industrial Relations.

Willys-Overland Motors, **George M. Newlin**, Asst. Director of Sales, Agricultural and Special Farm Implement Div.

Kaiser-Frazer Corp. and Graham-Paige Motors, **O. B. Motter**, Vice-Pres. in chg. of Public Relations; **Frank A. Detwiler**, Service Mgr.

Graham-Paige Motors Corp., **John D. Warren**, elected a member of Board of Directors.

The Aviation Corp., **R. C. Cosgrove**, Vice-Pres. in chg. of sales.

Glenn L. Martin Co., **G. T. Willey**, Vice-Pres. for Planning-Materiel; **D. W. Siemon**, Mgr. Industrial Relations and **C. E. Crowley**, Personnel Director; **G. L. Bryan, Jr.**, head of Technical Dept. of the Engineering Div.; **H. C. Wieben**, Design Dept. and **C. W. Miller**, in chg. of Administrative Dept.

Northrup Aircraft, **Robert H. Biron, Jr.**, Vice-Pres. in chg. of Industrial Relations; **Roland J. Pagen**, Treasurer. **Claude N. Monson**, Vice-Pres. in chg. of Finance. **Theodore C. Coleman**, Vice-Pres., resigned.

Kellett Aircraft Corp., **W. Fields DeGroat** and **John Gitz**, design engineering staff.

Lockheed Aircraft Corp., **George H. Prudden**, Works Mgr., newly created Factory C.

The Beech Aircraft Corp., **Col. H. C. Rankin**, Sales Mgr.

Lear, Inc., Aircraft Radio Div., **H. T. Sagert**, Sales Mgr.

Ethyl Corp., **John B. Macauley**, Director of Engineering Research; **Robert V. Kerley**, Director of Aeronautical Research and **E. O. Jones**, staff asst. to Julian J. Frey, Gen. Sales Mgr.

Sun Oil Co., **Porter L. Howard**, General Traffic Mgr. **Colonel William O. Kinsolving**, Mgr. of all Sun Oil Co.'s pipeline operations.

United States Plywood Corp., **Clifford P. Setter**, Vice-Pres. and Chief administrative officer.

Prest-O-Lite Battery Co., Inc., **J. A. Franklin**, Asst. Sales Mgr.

Reynolds Metals Co., **Col. Thomas A. Murphy**, Aviation Industry Mgr.

Menasco Mfg. Co., **William D. Mewhort**, Treasurer.

Borg-Warner Corp., Morse Chain Co. Div., **Ray P. Johnson**, Asst. to the Gen. Mgr.

Fairbanks, Morse & Co., **Charles H. Morse III**, elected Vice-Pres. in chg. of research patents, traffic, etc.

The Clark Mfg. Co., **Charles W. Stewart**, Vice-Pres. in Chg. of Sales.

Superior Coach Corp., **Richard W. Caswell, Mgr.**, Integral Bus Div.

Velvac, Inc., **William S. Campbell**, Service Sales Mgr.

Progressive Welder Co., **John D. Gordon**, Gen. Mgr. and **Carl L. Halpin**, Mfg. Works Mgr.

United States Rubber Co., U. S. Tire Div., **Walter D. Baldwin**, Sales Mgr.

Colonial Broach Co., **Ralph G. Lagerfeldt**, Vice-Pres., and **Frances E. Pethick**, Treas.

Gar Wood Industries, Inc., **Leon C. Hulse**, Mgr. new plant at Mattoon, Illinois.

The General Tire & Rubber Co., **James D. Perley**, Director, Industrial Relations for all plants.

Ohmer Corp., **R. H. L. Becker**, Vice-Pres.

Motor Wheel Corp., Pres. and Gen Mgr., **H. F. Harper**; Exec. Vice-Pres., **J. E. Garlent**; Vice-Pres.-Treas., **D. L. Porter**; Vice-Pres.-Sales, **C. S. Holden**; Vice-Pres. Duo-Therm Div., **M. F. Cotes**; Vice-Pres.-Engineering, **J. Harold Hunt**; Vice-Pres.-Sec., **C. C. Carlton**; Asst. Sec., **B. J. Adams** and Asst. Treas., **C. A. Benson**.

TelAutograph Corp., **Roy J. Keller**, Gen. Sales Mgr.

General Armature Corp., **A. C. DeAngelis**, President.

Worthington Pump and Machinery Corp., Engineering Dept., Ransome Machinery Co., **John P. Faver**, Asst. to Gen Mgr. and Consulting Engineer. **J. E. Bushnell**, Chief Engineer, **George W. Cronk**, Chief Draftsman.

The Fellows Gear Shaper Co., **E. J. Fullam**, President; **E. W. Miller**, Vice-Pres. and Gen. Mgr.; **R. M. Fellows**, Vice-Pres. and Treas.

H. O. Canfield Co., **E. R. Staley**, Sales Mgr.

Pratt & Whitney Div., Niles-Bement Pond Co., Wiliam P. Kirk, Vice-Pres., has been elected President of the National Machine Tool Builders Assoc.

Pennsylvania Salt Mfg. Co., **Warner R. Over**, Treas.; **Fred C. Abbott**, Mgr. of New Products Div.

Reliance Electric & Engineering Co., **Harold J. Thompson**, District Mgr.

Victor Mfg. & Gasket Co., **Captain George E. Victor**, Executive Vice-Pres.

Fruehauf Trailer Co., **Robert S. Kirksey**, Pres. of Fruehauf Trailer Co. of California; **Walter J. Pickhardt**, Vice-Pres. and Gen. Mgr.

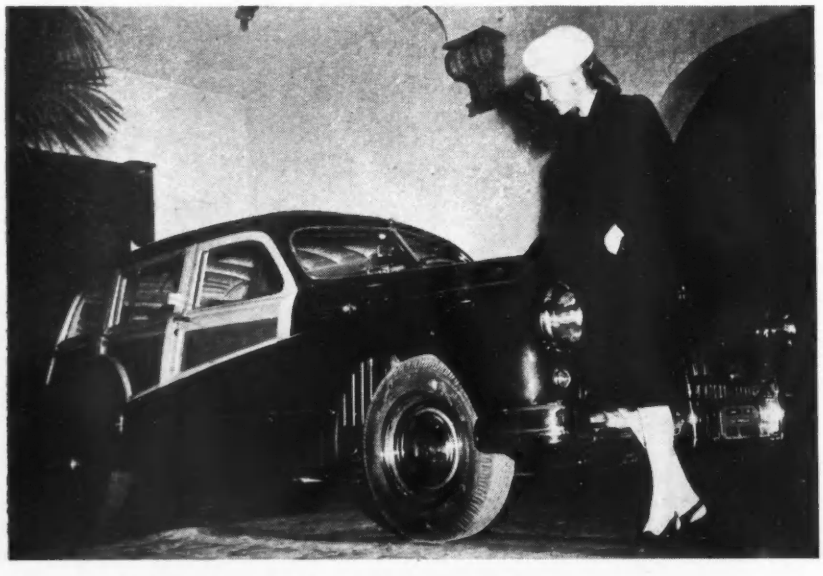
Baldwin Locomotive Works, **Robert G. Allen**, Gen. Sales Mgr.

Improved Engine for Navy PT Boats

Having built 13,000 of the V-12, 1500-hp marine engines for Navy PT boats during the war, Packard Motor Car Co. was ready to deliver an improved model with an output of 1800 hp just before the fall of Japan, according to an announcement by George T. Christopher. It is basically the same engine but incorporates a higher speed supercharger in combination with an aftercooler which lowers the temperature of the fuel and air mixture entering the intake manifold and thus improves charge efficiency. The new model weighs only 90 pounds more than its predecessor. Navy contracts will carry production on this model through the forepart of 1946.

Judging by statements made by Mr. Christopher on previous occasions, there is a possibility that ultimately Packard will make civilian adaptations of the marine engine. Among these might be marine models, industrial powerplants, and smaller output modification—perhaps with less cylinders—for use in heavy duty motor trucks and off-the-road equipment.

Buick "Estate Wagon"



Attractive design with sweeping airfoil fenders and new massive front end treatment characterize this new Buick model. It is built on a 124-in. wheelbase.

CALENDAR

Conventions and Meetings

American Association of Motor Vehicle Administrators, Chicago — Nov. 13-16

National Metal Trades Assoc., Cleveland, Ohio, Annual Convention — Nov. 15-16

National Aviation Clinic, Oklahoma City, Okla., 1945 National Clinic — Nov. 19-21

American Society of Mechanical Engineers, New York City. N. Y., Annual Meeting — Nov. 26-30

SAE Natl. Air Transport Engineering Meeting, Chicago, Ill. — Dec. 3-5

Natl. Assoc. of Manufacturers, New York City; Golden Anniversary Congress — Dec. 5-7

Miami All American Air Maneuvers, Miami, Fla. — Jan. 4-6

SAE Annual Meeting and Engineering Display, New York, N. Y. — Jan. 7-11

American Society for Metals, Cleveland-Nat'l. Metal Show — Feb. 4-8

American Society for Testing Materials, Pittsburgh Spring Meeting — Feb. 25-Mar. 1

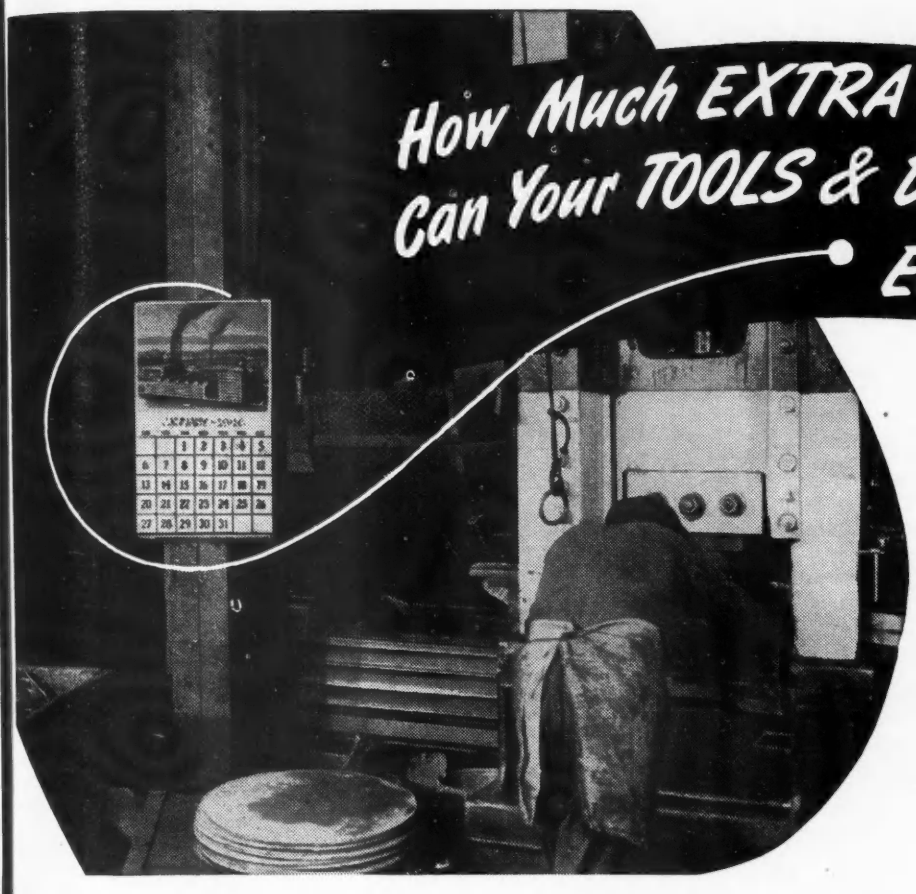
SAE Natl. Aeronautic Meeting, New York, N. Y. — Apr. 3-5

American Society of Tool Engineers, Cleveland Tool Engineers Exposition — Apr. 8-13

Natl. Assoc. of Corrosion Engineers, Kansas City, Mo., Annual Meeting and Convention — May 7-9

Associated Business Papers, Hot Springs, Va., Spring Meeting — May 22-25

American Society for Testing Materials, Buffalo Annnual Meeting — June 24-28



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Extra output from your tools will cut unit costs. With this 3-step *job analysis* program you can actually predetermine tool performance on each job. For more output per month and lower production costs, put this 3-step plan to work now.

1. Your Real Key To More Output From Tools

By knowing *in advance* what performance to expect from your tools you can reduce idle machine and press time. And the Carpenter Matched Set Method gives you a way to do just that. It's a sure-fire way to get tools that need fewer regrindings and replacements. This 167-page Manual points the way to the tool steel properties you need—greater wear resistance, more toughness, etc. With its 80-page Tool Index and Steel Selector you can quickly find the best starting place when you have a new tool to make. For easier tool steel selection and better results on the job, send for this Carpenter Manual. Just drop us a note on your company letterhead.

2. Lick Hardening Trouble At The Start

Proper heat treatment is the second step to better tools that cut costs. To get the heat treating results you want, use the "Matched Tool Steel Manual". It contains the most complete heat treating information available in printed form. And as a special help to your heat treaters, we have prepared a handy slide chart that condenses the basic heat treating information and puts it in easy-to-use form. Drop us a line and let us know how many Carpenter heat treating slide charts you will need.

3. Keep Records Of Tool Output Per Grind

Follow each tool set-up on the job. Check the reasons for any premature failure or too frequent regrinding. You'll soon spot new ways to make your tools save production time—and money. And when you want personal help with a tooling problem call on your nearby Carpenter representative. He really knows tool steel and can help you reduce costs all along the line.

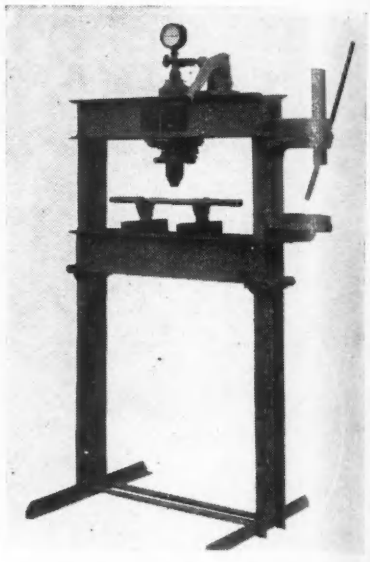
The Carpenter Steel Company
103 W. Bern St., Reading, Penna.

Carpenter
MATCHED
TOOL STEELS

New Production Equipment

A WIDE variety of pressing, straightening, bending, flattening, assembling and other operations can be performed on the 25-ton hydraulic press manufactured by the Mech-Art Products Corp., York, Pa. The press is self-contained, thus it can be located in the most convenient place and moved about at will. Power is applied by hand operation and eight strokes of the pump equal 1 in. of ram travel which results in fast press action.

The press cylinder is a steel casting. The table is supported by two alloy steel pins which rest in four inverted V-bearings. Handle grips at end of table make possible adjustment in the height of table to handle various size work. Distance between uprights is 30 in. The table travel is 35 in., ram travel is 4½ in., ram diameter is 2¾ in., width between table channels is 5⅛ in. Overall height is 60 in. and floor space required, 34 in. by 27½ in. Weight—420 lb, with arbor press.

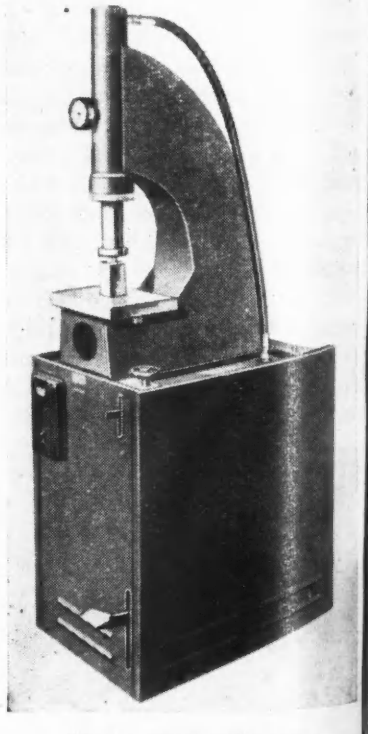


25-ton Mech-Art press

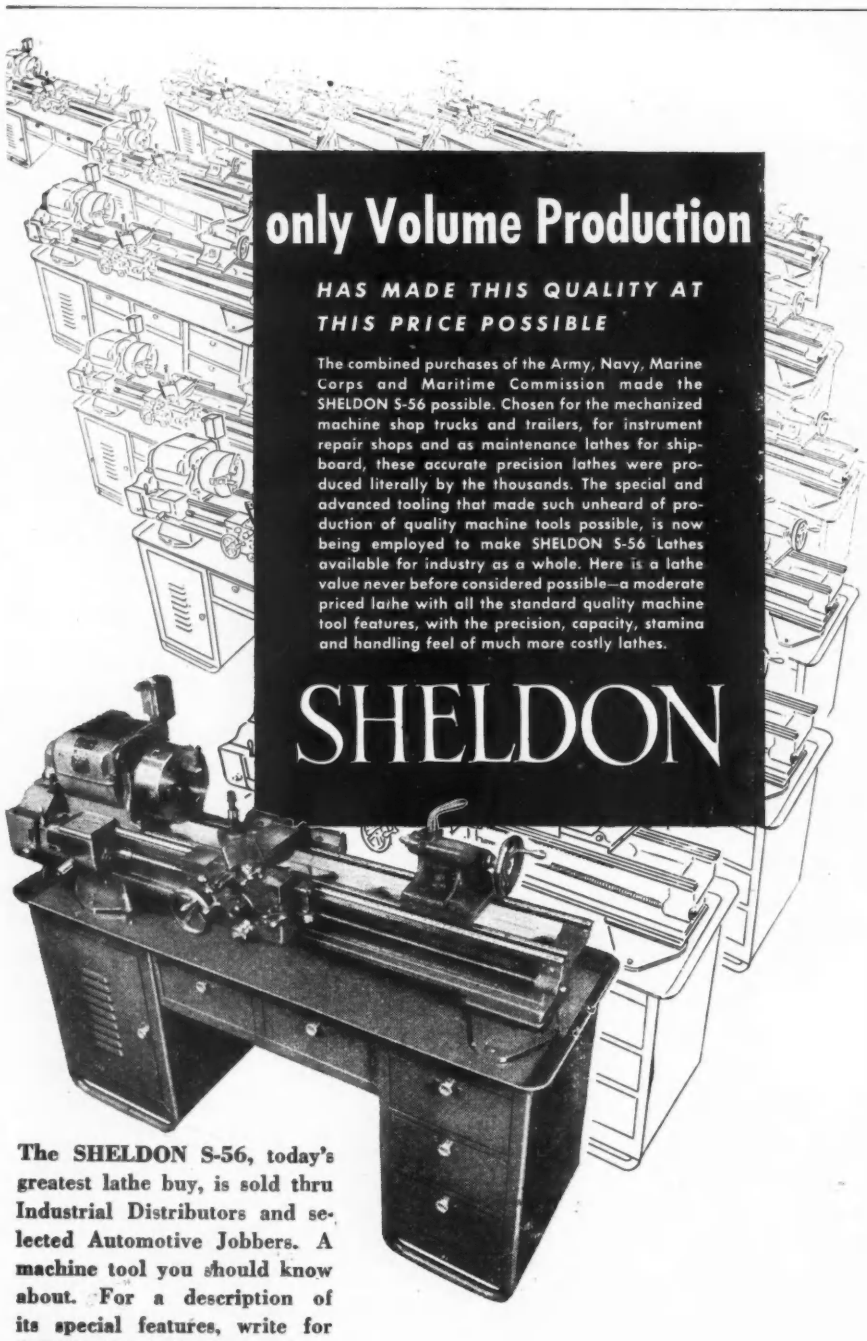
MUNTON MANUFACTURING CO., Franklin Park, Ill., offers a new line of positive self-contained hydraulic presses which are available with self-contained motor drive for production work, foot operated, either mounted with bottom of press open or flush as illustrated.

They are built in capacities of 4½-T-

(*Turn to page 52, please*)



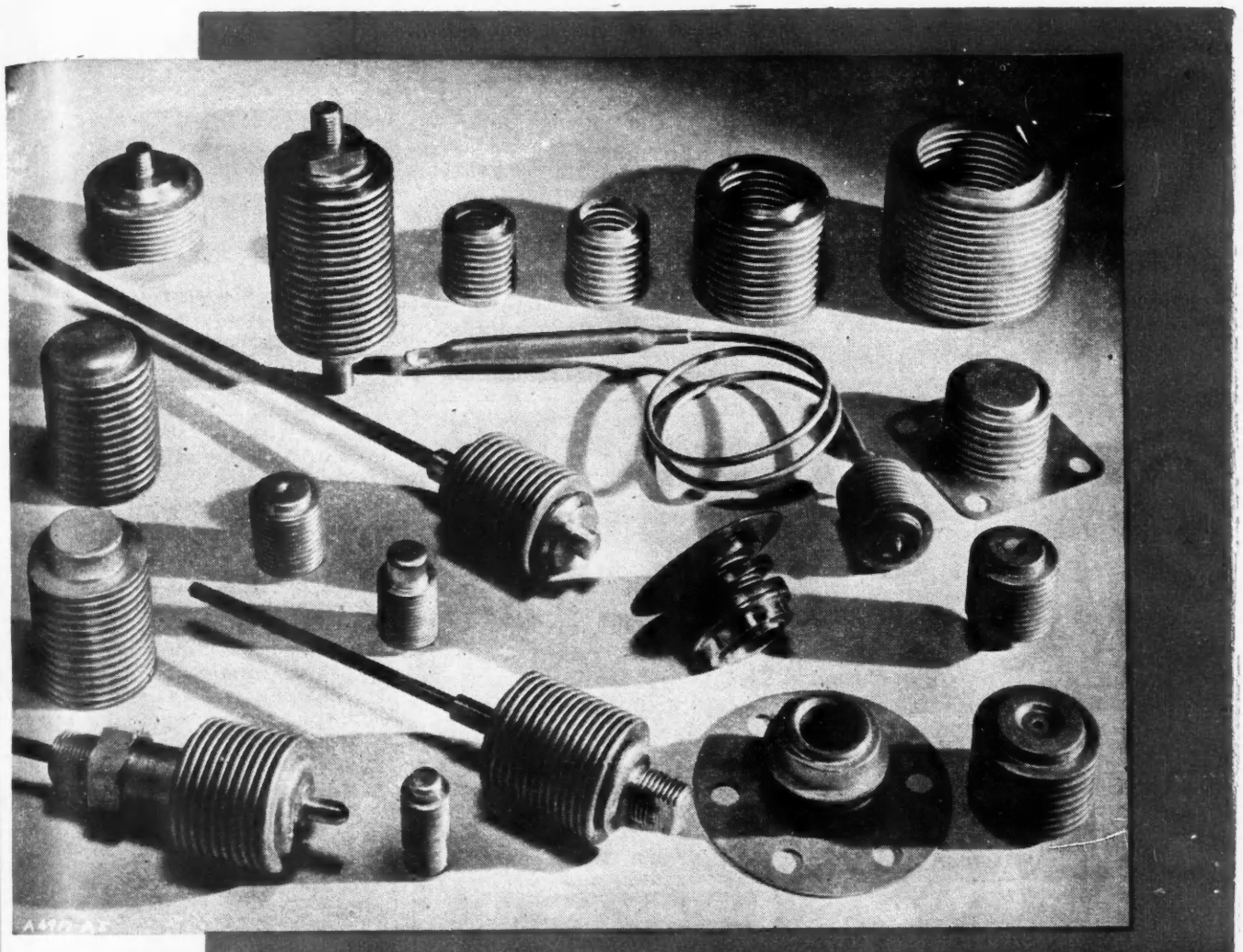
Munton hydraulic press


only Volume Production
HAS MADE THIS QUALITY AT THIS PRICE POSSIBLE
The combined purchases of the Army, Navy, Marine Corps and Maritime Commission made the SHELDON S-56 possible. Chosen for the mechanized machine shop trucks and trailers, for instrument repair shops and as maintenance lathes for shipboard, these accurate precision lathes were produced literally by the thousands. The special and advanced tooling that made such unheard of production of quality machine tools possible, is now being employed to make SHELDON S-56 Lathes available for industry as a whole. Here is a lathe value never before considered possible—a moderate priced lathe with all the standard quality machine tool features, with the precision, capacity, stamina and handling feel of much more costly lathes.
SHELDON

The SHELDON S-56, today's greatest lathe buy, is sold thru Industrial Distributors and selected Automotive Jobbers. A machine tool you should know about. For a description of its special features, write for "SHELDON S-56 Circular."

SHELDON MACHINE CO., INC.

4220 N. Knox Avenue **Chicago 41, U.S.A.**



HERE MAY BE YOUR ANSWER...

...or here

SOMETIMES, in our hurry to get there, we neglect the shortest way home.

For example—the solution to many bottlenecks in temperature regulation may be found in the photograph above ... or this message itself may suggest an answer to your problem.

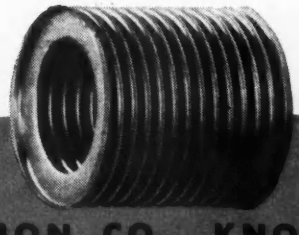
Fulton Sylphon thermostats and bellows assemblies are the basis of controls used in every industry. They regulate oil, water, and air temperatures; they function in engines on land, sea and in the sky; they do an amazing number of jobs in manufacturing plants, institutions, homes. Automatic in operation, they eliminate countless manual tasks.

Fulton Sylphon engineers will work with you, help find the most effective and economical answer to your problem.

NEW MOVIE—The Story of a Bellows is available to interested groups. 16mm and 35mm sound. Tells all about bellows, how they're made, what they do, how they do it.

Catalog WB-1300 tells all about Fulton Sylphon bellows and bellows assemblies. Write for it.

FULTON SYLPHON



TEMPERATURE CONTROLS — BELLOWS . . . BELLOWS ASSEMBLIES

THE FULTON SYLPHON CO., KNOXVILLE 4, TENNESSEE

Canadian Representatives, Darling Brothers, Montreal

10-15-20- and 25 tons, with means to limit pressures as low as required. Pressure gages help determine pressures being applied, such as in laboratories, testing, etc. A holding valve may be ordered as an extra, enabling press to be used for certain molding or glue weld operation, which causes ram to be held under pressure until lever is tripped.

These presses are being used for operations such as push-broaching, forming, blanking, drawing squeeze assembly of bushings, etc.; straightening, shot-pushing, and numerous other operations requiring positive, powerful push with minute control.

HE new Air-Speed saw and filing tool driven by compressed air is ready for national distribution, according to the Air-Speed Tool Co., Los Angeles, Cal.

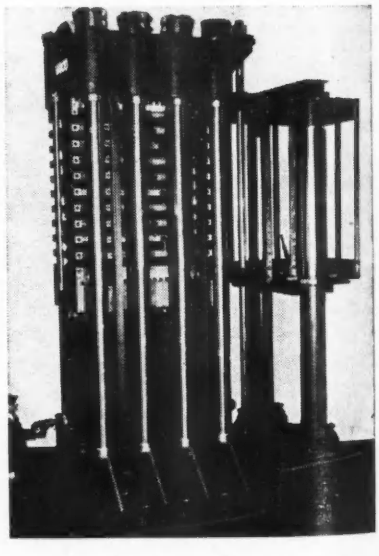
Designed to simplify and speed-up most sawing and filing operations, the Air-Speed tool can be worked advantageously in awkward or cramped quarters or from difficult positions. An adjustable barrel permits circular sawing in metals or woods, as well as "dead end," keyhole or scroll work. Weighing only 3½ lb complete, the new tool features finger tip speed and power control, and a cutting stroke adjustment of from ¼ in. to 1¼ in.

Air-Speed saw

No gears, adaptors or power take-off devices are used in the construction of the Air-Speed saw, and only two internal operating parts are movable.

The saw operates best with approximately 85 lb pressure maintained at the tool.

R. D. WOOD CO., Philadelphia, Pa., is making a 2,700-ton steam platen press for laminating, curing and polishing plastic sheets to uniform thickness and surface finish. A feature of this unit is the quick loading and unloading mechanism incorporated as a part of both the press and the elevator, which permits moving the material in and out of press without sliding over or in any way contacting the polished platen surfaces. This eliminates scratching or scoring of the highly finished platens.



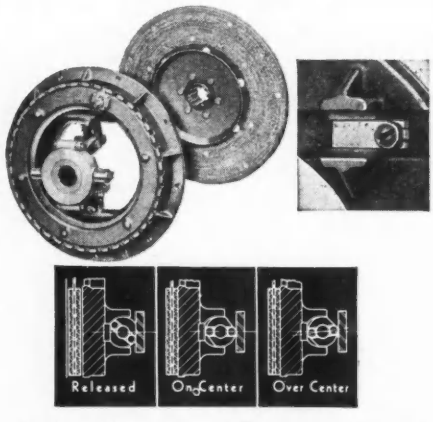
Wood steam platen press

The operating sequence is as follows: while sheets are being cured in the press, "sandwiches" to be processed are prepared and inserted between planishing plates and rolled into alternate openings of the twenty-opening elevator. When elevator is loaded, press is opened, elevator raised to unloading position and cured sheets rolled from press into the ten empty openings of elevator. Elevator is then raised or lowered to loading position and the ten unprocessed packages rolled into press

(*Turn to page 56, please*)

Specify ROCKFORD OVER-CENTER *for* CLUTCHES

EASY OPERATION
HIGH TORQUE *
POSITIVE ENGAGEMENT
LARGE DRIVING AREA
SMOOTH RUNNING
INFREQUENT ADJUSTMENT
MINIMUM INERTIA



* Equally spaced, hardened and ground roller cams, bearing upon hard steel insets, exert heavy pressure evenly over the entire ROCKFORD Over-Center CLUTCH face—producing unsually high torque, for the clutch size and weight.

SEND FOR THIS HANDY BULLETIN ON POWER TRANSMISSION

It shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every production engineer will find help in this handy bulletin, when planning post-war products.

ROCKFORD CLUTCH [FORMERLY KNOWN AS] DIVISION BORG-WARNER CORPORATION
315 Catherine Street, Rockford, Illinois, U.S.A.

ROCKFORD CLUTCHES
SPRING LOADED · OVER CENTER · ONE-WAY · SPRING LOADED · L.O.C. · POWER TAKE-OFF · PULLMORE MULTIPLE-DISC · OVER CENTER

PLASTICS *present and future*

NYLON PAINTBRUSH BRISTLES—Also new are tapered *nylon bristles* for *paintbrushes.* When the war began, they had not been perfected; today they have years of service behind them. The Navy has used millions of them. Repeated tests show that nylon bristles which are tough and resilient, also resist attack from cold-water paints or kalsomine, and possess a combination of advantages unobtainable in any other type of bristles. They spread paint evenly and well, and they last at least three to five times longer than the best natural bristles.

HEAT-RESISTANT "LUCITE"—An added wartime development is a new formulation, HM-122, high heat-resistant "Lucite" molding powder. HM-122 provides heat-resistance 30 to 40° F higher than that of general-purpose acrylic powders. In war it has been used for military vehicle lenses, parts of sextants, airfield landing-light lenses. In peace it will serve, among other uses, in automotive, refrigerator and radio parts. It can be produced in a variety of attractive colors. Two other new formulations of "Lucite" powder provide ease of molding with various degrees of heat resistance. These "Lucite" molding powders require a minimum of finishing operations after molding.

OTHER DU PONT PLASTICS—The war years saw those old reliables, "Pyralin" cellulose nitrate plastic and "Plastacele" cellulose acetate plastic, take on a wider variety of jobs, often saving weight and conserving precious metal. "Butacite" polyvinyl butyral resin, the tough plastic used as the interlayer of safety glass, has also been used successfully between sheets of "Lucite" to protect airplane enclosures of pressurized cabins against shattering. "Butacite" sheeting remains flexible and tough under a wide range of temperatures. In flake form, "Butacite" forms an excellent impregnating and waterproofing medium for fabrics; it is also used for fabric coatings (hospital sheeting, raincoats, etc.).

From Du Pont's extensive *research*, several promising new plastics are expected to be ready during the first five post-war years. To produce these plastics and to meet expanding demand for existing ones, Du Pont is erecting a *new plant*, in addition to the present operation of one of the largest plastic plants in the country. These plastics will help perform many tasks better and more economically; they will also make many products more attractive, more salable. And so, Du Pont faces the future with confidence—confidence that in the years immediately ahead more people can apply plastics for more and different purposes.

The broad experience of the Du Pont plastics engineers is at your service, to help you determine whether a Du Pont plastic can help your product do a better job. Address: E. I. du Pont de Nemours & Co. (Inc.), Plastics Dept., Arlington, New Jersey.

Share in the Victory—BUY BONDS

for PLASTICS. . *consult* DU PONT

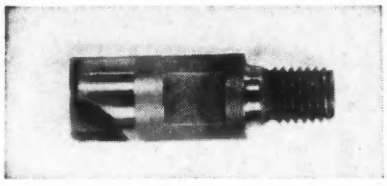
DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...*THROUGH CHEMISTRY*

for curing. Elevator is then lowered, cured sheets removed and complete cycle repeated. With this type of equipment, the manufacturer points out, idle press time is practically eliminated.

A NEW rivet shaving cutter is announced by the Zephyr Manufacturing Co., Inglewood, Cal. The new cutter will fit the company's standard micrometer stop countersink drive as well as standard rivet shaving machines.

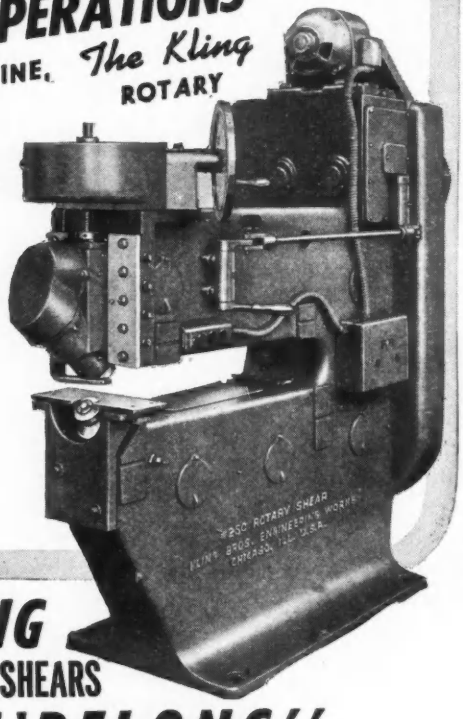
The Zephyr cutter is made of 18-4-1 steel and is electrolized which provides a surface hardness of approximately C-82. The Zephyr Manufacturing Co. also makes the same cutter with tungsten carbide tips on which the average use is said to be from 36 to 40 hours, according to recent field tests.

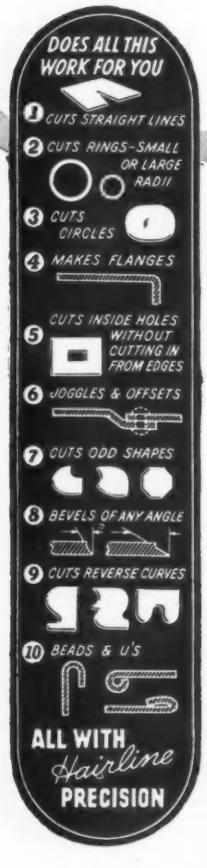


Zephyr rivet shaving cutter

A Variety of SHEARING OPERATIONS WITH ONLY ONE MACHINE, The Kling ROTARY

1. CUTS STRAIGHT LINES
2. CUTS RINGS—SMALL OR LARGE
3. CUTS CIRCLES
4. MAKES FLANGES
5. CUTS INSIDE HOLES *Without Cuttings-in from Edges*
6. CUTS JOGGLES & OFFSETS
7. CUTS ODD SHAPES
8. BEVELS OF ANY ANGLE
9. CUTS REVERSE CURVES
10. BEADS & U'S




DOES ALL THIS WORK FOR YOU
1 CUTS STRAIGHT LINES
2 CUTS RINGS-SMALL OR LARGE RADII
3 CUTS CIRCLES
4 MAKES FLANGES
5 CUTS INSIDE HOLES WITHOUT CUTTING IN FROM EDGES
6 JOGGLES & OFFSETS
7 CUTS ODD SHAPES
8 BEVELS OF ANY ANGLE
9 CUTS REVERSE CURVES
10 BEADS & U'S
ALL WITH Hairline PRECISION

KLING ROTARY SHEARS "BELONG"

Wherever Metal Cutting Must be Done Quickly and Accurately, their Use

Speeds Production and Clips Costs

Advantages the use of KLING Rotary Shears afford in peacetime, as during high-pressure war time demands, speak for themselves. Saving of floor space, and low cost of operation, are other factors which make them the preferred shear for metal cutting operations.

Send today for Bulletin No. 245 which tells many things about KLING Rotary Shears you want to know, and should know. A copy will be mailed promptly on request. Address:

KLING BROS. *Engineering Works*
1318-A5 NORTH KOSTNER AVE., CHICAGO 51, ILL.
EXPORT DEPT. 1111 So. Ferry Bldg., New York 4, N.Y.

Airbriefs

(*Continued from page* 40)

saved are now turning against us and trying to prevent us from attaining that place in the air which we have won and where we can make air transport a cheap, popular form of transportation. If air transport is to be ruled to the point where no nation can outdo the more inefficient nations nor carry passengers cheaper than luxury liners, the nation doing the ruling is performing a disservice to man. Were we in the same relative position on the seas I am certain that there would be an attempt to limit our shipping and a demand for freedom of the air. Anyone who has read AIRBRIEFS knows that I admire the British. We all know their technical prowess, their fine sportsmanship, their strict adherence to their contracts but, unfortunately, they have had and have, nationally a policy of smashing any kind of competition by any other nation. This has been a factor in Europe's various wars and the British would do the world a service by dropping it and adopting one of free world competition. Air transport can only succeed on this basis and there is no reason why one should pay $575 to go to London when the American lines are willing to reduce prices. If the steamship companies cannot make luxury liners pay in any other manner than by limiting air transport or the lines of foreign aviation companies cannot compete with ours freely, then they should withdraw their services.

Gasoline Prices

A radio commentator brought out an amusing order of the OPA. It seems that the Union Oil Co. of California wanted to sell 91 octane gas to motorists at the price they have been selling it for several years for planes, but the "master minds" in Washington forbid them to do it as they only had three "recognized" grades of motor fuel. I sometimes wonder what Washington, Franklin and the other really great men of the past would do if they could come back to life and wander through the halls of government in Washington and gaze upon the antics of the thousands of little politicians from the hinterland who have jobs of greater or less magnitude given them as a reward for pushing doorbell buttons.

Plywood Finishes

New finishes for plywood made of plastic impregnated paper so thin that it is transparent but very hard and resistant, offer many possibilities for seaplane hull and airplane wing and fuselage protection.

JESSOP warehouses are strategically located to expedite delivery of JESSOP TOOL STEELS and other JESSOP Specialty Steels. Since the end of the war our mill and warehouse stocks have steadily increased, so that in most cases the steel you order will be on its way within a matter of hours.

Through the JESSOP WAREHOUSE SERVICE you can make substantial reductions in your tool steel inventories, because adequate stocks are available *when* you need them. And by lowering your inventories you will have more capital available for your reconversion program.

JESSOP High Speed, Alloy and Carbon Tool Steels are stocked in all standard shapes and sizes. The Jessop technical service representative will assist you in selecting the tool steel best fitted for your needs. And the Jessop Warehouse Service will insure your receiving the steel *when* you need it. Phone or write the nearest Jessop branch office for immediate help on your tool steel problems.

JESSOP STEELS CARRIED IN STOCK:

TOOL STEEL (high speed, alloy, and carbon) in bars, forgings, and sheets; HOBBING STEEL; CAST RING DIE; DRILL ROD (carbon, oil hardening, high speed); MUSIC WIRE, any size coil; CUTTING TOOLS, high speed tool bits in all grades (sand blasted or ground), cast non-ferrous bits, carbide tipped tools; GROUND GAGE STOCKS, water and oil hardening; OIL HARDENING GROUND PLATE; STAINLESS STEEL in bars (hot rolled and cold finished), sheets, and plates; STAINLESS WELDING ROD.

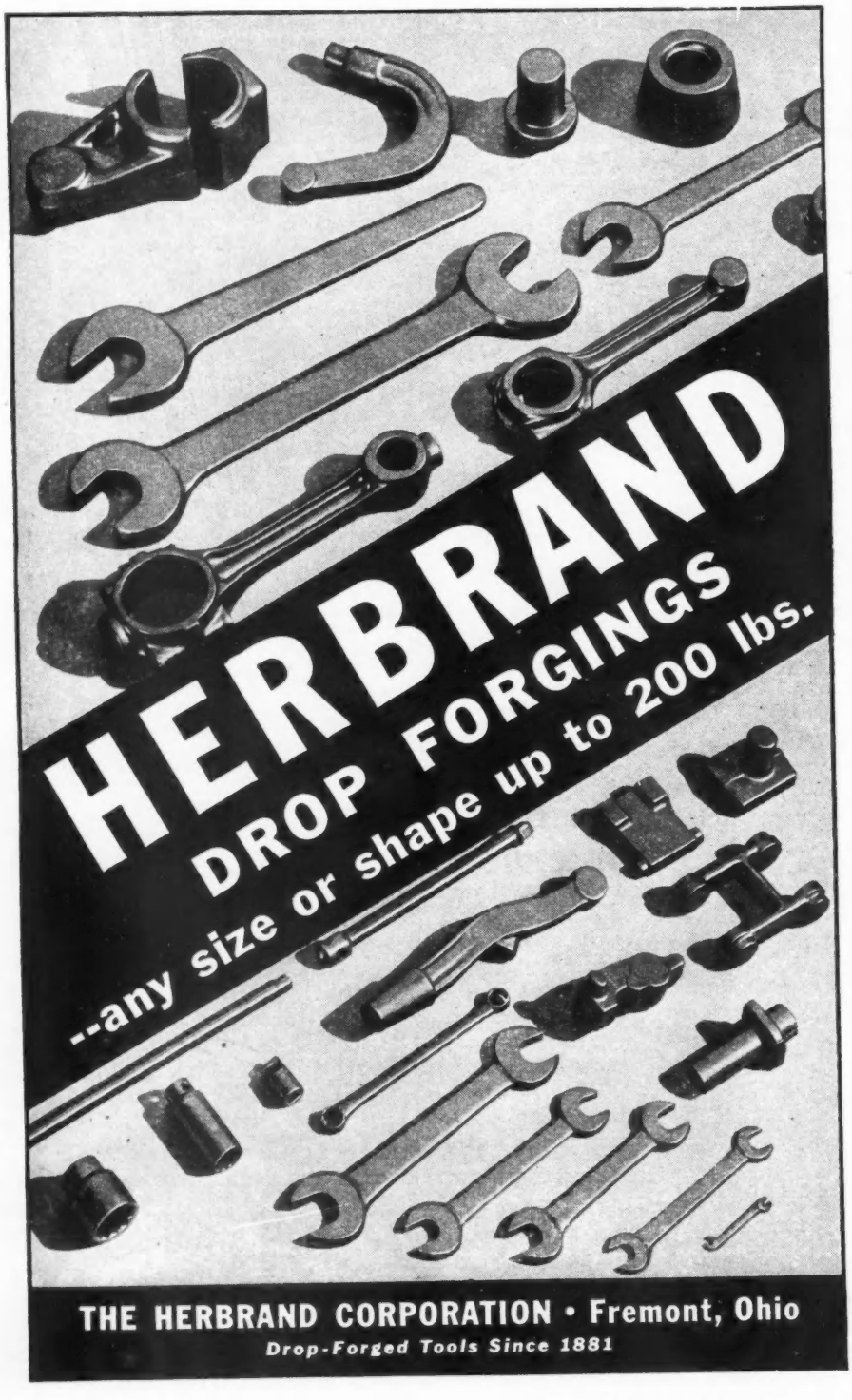
JESSOP STEEL CO.

WASHINGTON, PENNA.

NLRB Takes FAA Issue To Federal Court

Hearings before NLRB in Detroit on a petition by the Foreman's Assn. of America for representation of supervisory employes at Chrysler Corp. took an unexpected turn when the agency went into Federal Court to ask a court order which would compel Robert H. Keys, president of FAA, to produce correspondence with local UAW-CIO and CIO locals. According to a board spokesman, NLRB wants to look into communications between FAA and rank-and-file unions with reference to the organization efforts of the foremen's union. Keys had refused to provide the letters and records. The court has ordered Keys to show cause why he should not produce the requested material, and has given him until Nov. 19 to comply. Hearings have been suspended for the present.

Organization of foremen also came in for Congressional consideration following the coal strike, in which organization of supervisory employes was the major issue. A group of congressmen, led by Rep. Shafer of Michigan, has proposed a measure which would eliminate foremen and other supervisory employes from unionization.


HERBRAND
DROP FORGINGS
--any size or shape up to 200 lbs.
THE HERBRAND CORPORATION • Fremont, Ohio
Drop-Forged Tools Since 1881

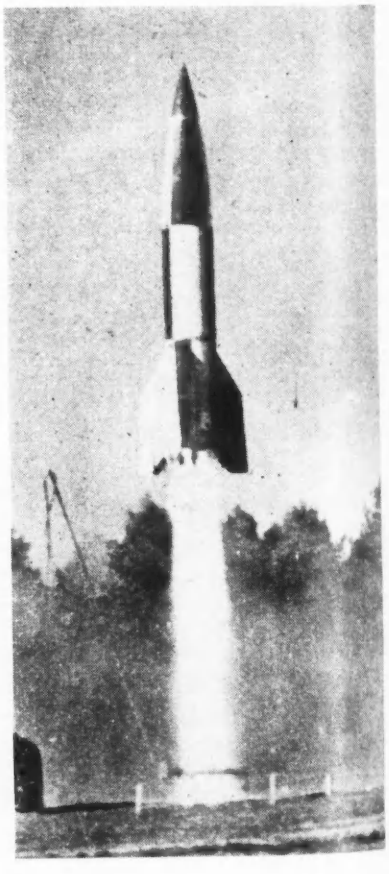
GM Buys Land for Assembly Plant Near Framingham

General Motors Corp. has acquired more than 175 acres of land south of Framingham, Mass., for the erection of a plant to assemble Buick, Oldsmobile and Pontiac cars. It will eventually employ about 3000 people.

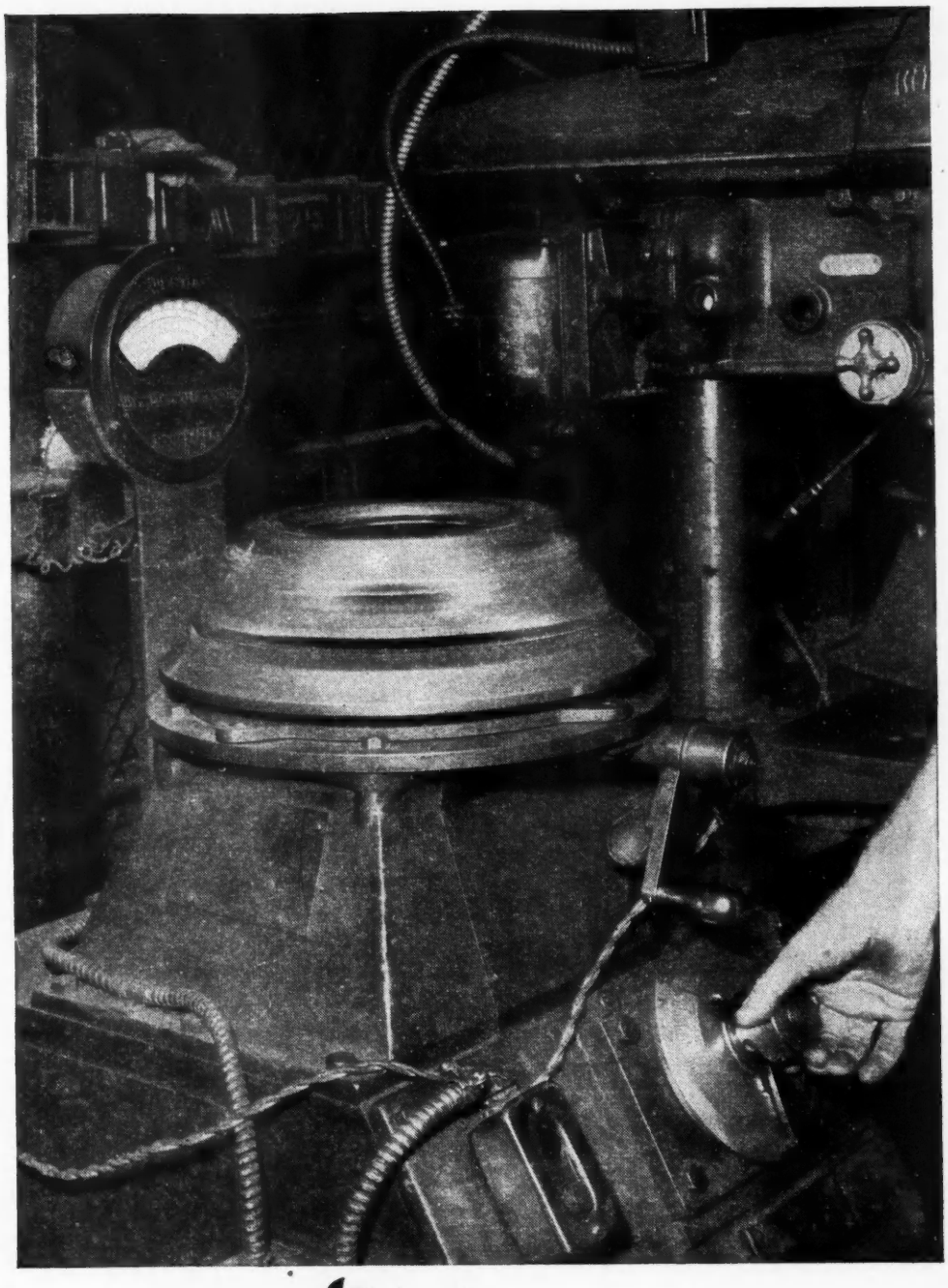
General Motors has been searching for a suitable site for a plant in the Boston area for more than a year, and in that time has inspected many locations.

Ground will be broken for the new project just as soon as bids have been received and the contract awarded. According to present schedule, this should be early in December. While the date of the plant's completion will be governed to a great extent by the availability of construction materials, it is hoped by General Motors that the project will be completed and ready for automobile assembly by the summer of 1946.

Experimental V-2 Rocket



A German V-2 rocket being launched at Cuxhaven, Germany, where British scientific experts are experimenting with this equipment. The V-2 rocket, which weighs 13½ tons, produces a thrust of 68,500 lb. for 65 sec. using about nine tons of alcohol and liquid oxygen. A description of it was published in the Jan. 1, 1945 issue of Automotive and Aviation Industries.



For Balanced Performance

ABOVE: HIGH-SPEED BALANCING OF CLUTCH COVER PLATE ASSEMBLIES. Every Long clutch is carefully checked at every step in manufacture . . . another reason why the user enjoys effortless pedal action and the resulting fine performance a Long clutch assures. Long Manufacturing Division, Borg-Warner Corporation, Detroit and Windsor.

LONG

CLUTCHES • RADIATORS • OIL COOLERS

Sun Oil Co. Plans to Expand Facilities

Sunoco Dynafuel, the new automotive gasoline now being marketed in 18 states by the Sun Oil Co., has a road test Octane number of 85 plus, according to officials of the company. On a similar basis the prewar gasoline had an Octane rating of 80.

In addition to the introduction of Dynafuel, which contains a large amount of catalytically cracked fuels, the Sun company has plans for an expansion program amounting to nearly $20 million. Over $10 million will be spent on new retail outlets, starting with the construction of 400 service stations of a new design during the next 12 months. The expansion programs provides for the purchase of service station equipment, nearly $1 million worth of new truck equipment, and the erection of new warehouse facilities in principal areas including New York, Philadelphia, Baltimore, Detroit and Syracuse.

White Plant in Canada

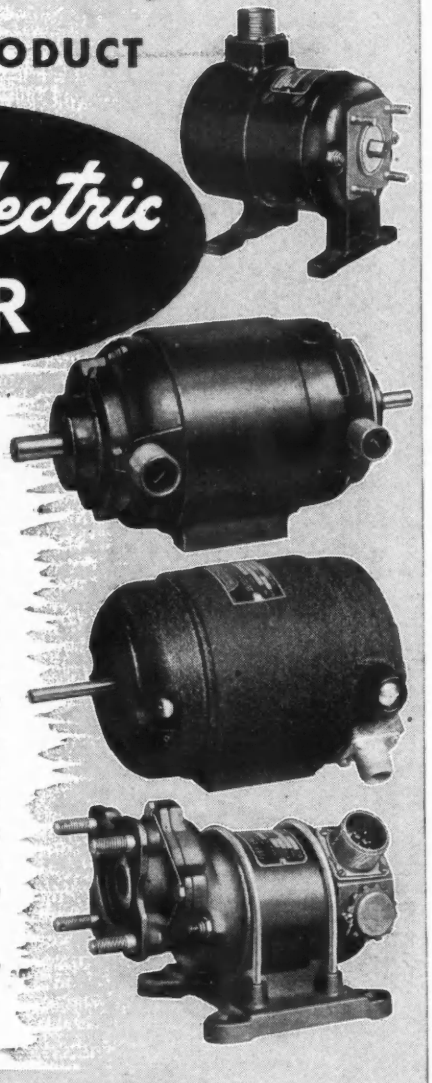
Ground has been broken for a new million-dollar plant for the manufacture of White motor trucks and buses in Montreal, according to Robert F. Black, president of the White Motor Co. Canadian operations are conducted by the White Motor Company of Canada, Limited, subsidiary organization, of which L. M. Hart is president.

Low Weight... Compactness

for your *New* PRODUCT

WITH A

Lamb Electric MOTOR



30 YEARS' experience designing and building fractional horsepower motors for all types of special applications has taught us where and how much *motor* weight can be reduced without interfering with essential electrical characteristics. Our knowledge of products gained by close cooperation with many types of manufacturers frequently enables us to make design suggestions that reduce *product* weight, as well as improve compactness. It is best to discuss the motor while your products are in the *early stages* of development.

THE LAMB ELECTRIC COMPANY
Kent, Ohio

Lamb Electric
FORMERLY *Black & Decker Electric*
SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE AND AVIATION INDUSTRIES

Increased stability of general business activity has been indicated. *The New York Times* index for the week ended Oct. 20 stands at 115.3, as against 115.1 for the preceding week and 137.2 a year ago.

Sales of department stores, as reported by the Federal Reserve Board, for the week ended Oct. 27 were 12 per cent greater than those in the corresponding period last year. The total for the year to date is 11 per cent above the comparable 1944 figure.

Electric power production during the week ended Oct. 27 increased more than seasonally. Total output, accordingly, was 9.7 per cent below that a year ago, as against a comparable decline of 9.9 per cent in the preceding week.

Railway freight loadings during the same period totaled 854,779 cars, 10.5 per cent more than the figure for the preceding week but 6.7 per cent below that for the corresponding period last year.

Crude oil production in the week ended Oct. 27 averaged 4,273,000 barrels daily, as against 4,236,850 barrels a week earlier and 4,740,900 barrels a year ago.

Bituminous coal and lignite production during the week ended Oct. 20, reflecting strike conditions, amounted to 5,780,000 net tons, the smallest weekly output since June, 1943. It is 5.7 per cent below the figure for the preceding week and less than half the quantity reported for the corresponding period last year. Total production thus far this year is 9.8 per cent less than the comparable output in 1944.

Civil engineering construction contracts awarded during the week ended Nov. 1 resumed an upward trend, according to *Engineering News-Record*. The total of $87,798,000 is 50 per cent above the figure for the preceding week and 171 per cent greater than the corresponding amount last year. The aggregate value of contracts recorded for 44 weeks of 1945 is 18 per cent more than the comparable sum shown in 1944.

The wholesale price index of the Bureau of Labor Statistics for the week ended Oct. 27 registered a further advance to 105.7 per cent of the 1926 average, as against 105.5 a week earlier and 103.9 a year ago.

Member bank reserves declined $28,000,000 during the week ended Oct. 31. Underlying changes reflected include an increase of $197,000,000 in Reserve bank credit and a rise of $134,000,000 in Treasury deposits with Federal Reserve banks, accompanied by an increase of $52,000,000 in money in circulation.

Total loans and investments of reporting member banks during the week ended Oct. 24 declined $68,000,000, notwithstanding a rise of $15,000,000 in commercial, industrial and agricultural loans. The sum of these business loans, $6,266,000,000, shows a net increase of $83,000,000 in twelve months.

Build a better Product

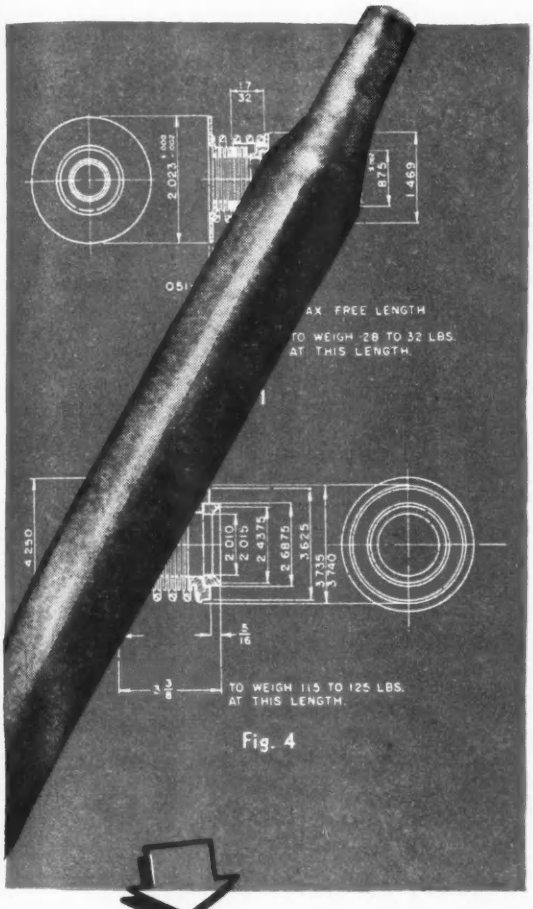


Fig. 4

26 pages packed with facts about bellows and bellows assemblies, plus a 3-page gate-fold chart on "Vapor Pressure—Temperature Relationships." Belongs in every file.

...Save a Pretty Penny!

Why manufacturers throughout New England say, "Let's have Bridgeport do that."

DECENTRALIZATION IS HERE TO STAY! One of the big production lessons of the war, this principle is causing more and more manufacturers to turn to Bridgeport Thermostat for bellows assemblies.

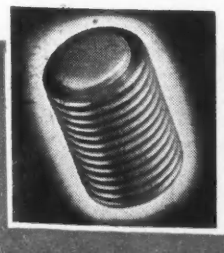
Many, in fact, have re-designed their products so as to incorporate Bridgeport thermostats, shaft seals, flexible joints, and many other types of bellows applications.

Why? Because, in addition to metal bellows, Bridgeport shines in the production of complete assemblies—producing them in unlimited quantities... *and usually at a lower cost than otherwise possible.* For Bridgeport saves the manufacturer valuable floor space, as well as the maintenance of a highly specialized and expensive department.

In addition, manufacturers have learned that...

Bridgeport units invariably give long-term satisfaction—are built to last as long as the product in which they are installed

Write for Bulletin **VB-100.** It contains information of interest to every manufacturer interested in improving quality and reducing costs.



Bellows Assemblies . . . Bellows . . . Bellows Devices

BRIDGEPORT THERMOSTAT COMPANY, INCORPORATED—BRIDGEPORT 1, CONN.

Why GM Rejected Claims

(*Continued from page* 36)

tion from 48 hours' work with 52 hours' pay to 40 hours' work with 40 hours' pay. It will be a reduction from an average of 45.1 hours' work with 47.7 hours' pay to somewhere between 39 and 45 hours' work with 39 to 47.5 hours' pay. Generalizations such as those in the OWMR report are inapplicable to specific industries, even if they were correct on the average, which they are not.

The OWMR memorandum also assumes that a reduction of one-half of the wartime increases in wages, other than changes in basic wage rates, when a company reconverts to peacetime production will yield a cost saving equivalent to another 9½ per cent of payrolls. The statement in the memo is as follows:

"The reduction in the cost of an hour's labor due to down-grading, elimination of shift premiums, and change in some of the other factors which account for the difference between the increase in general wage rates and the increase in average straight time hourly earnings (adjusted) during the war period. It is assumed that half this difference is reversed by 1946 by a process which has been referred to as the 'more frugal administration of wage schedules'."

It is stated elsewhere in the memo that this does not include inter-industry shifts and that incentive pay is not included in items that are likely to be reversed. That being the case, it is difficult to know what it can mean. "Downgrading" is mentioned as one of the factors, but while this would result in a reduction in wages for an individual, it could hardly result in a reduction in labor costs unless wage *rates* were also cut. The estimate that these somewhat indefinite factors will result in a cost saving equal to 9.5 per cent of payrolls, either for manufacturing industry in general or for a particular company is purely speculative.

The third source which the OWMR memorandum cites as a possibility for another 10 per cent increase in wages is the assumed increase in profits that will result from the repeal of the corporation excess profits tax. The amount of such a saving to industry again will depend on events,—not on this analysis. The excess profit tax was a wartime measure designed to recapture for the benefit of the entire country extra profits made in war production due to circumstances for which the employers should not be compensated.

In this same connection the OWMR memo states that a transfer of $2.7 billion from the profits of manufacturing corporations to the wages of their workers would, in conjunction with the repeal of the excess profits tax, leave their profits after taxes at about the 1942 level. Actually the calculation gives $4,680 millions against $4,900 millions in 1942. But in 1942 profits as a ratio of sales were too low to be compatible with peacetime prosperity and full employment. Profits after taxes evidently were too low in most years between 1929 and 1940 to encourage expansion and increased employment, as shown by the continued unemployment in the decade of the '30's.

The OWMR omits any reference to the fact that wages and salaries have increased more since 1939, and also since 1941, than other forms of income payments. From 1941 to 1944 wages and salaries increased 85 per cent; income payments of all sorts 69 per cent; profits of manufacturing corporations only 10 per cent. From 1939 to 1944 the corresponding figures were 155 per cent, 121 per cent and 124 per cent. Even the figure of $80 billion assumed by the OWMR to represent wages and salaries in 1946 would be 33 per cent higher than the wages and salaries of 1941, while the $6.3 billion assumed to represent manufacturing profits in 1946, at the rate of hourly earnings prevailing in April, 1945, would be only 20 per cent higher than in 1941.

(*Turn to page* 116, *please*)

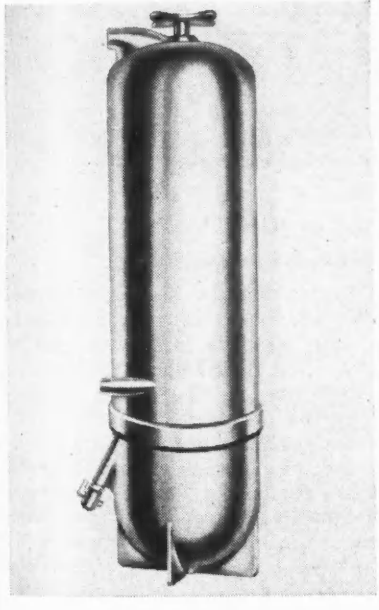
ST IN PEACE
as it was in war!
. . the clutch that is faithfully serving nearly half the automobiles, trucks and tractors in operation today.
For THAT VITAL SPOT where POWER TAKES HOLD OF THE LOAD!
BORG & BECK
The Standard Clutch
BORG & BECK DIVISION
BORG-WARNER CORPORATION
CHICAGO ILLINOIS

New Products

Filter for Cleaning Grinder Coolant

A new filter for cleaning grinder coolant and similar solid-bearing fluids is introdubed by Cuno Engineering Corp., Meriden, Conn. The "Coolant-Klean" has a replaceable bag-type filter element mounted on a screen spacer so as to provide a filtering area of 1000 sq in. for full flow. No filter aid is needed. Precoating time is eliminated.

When replacement of the bag is necessary, this is accomplished by loosening a single screw clamp to open the filter. The dirty element is discarded and the accumulated grit emptied from the sump. A clean bag is easily installed.



Cuno "Coolant-Klean"

The "Coolant-Klean" can be applied to any type of grinder and is also adoptable to almost any machine using a coolant or cutting oil. No alteration of the grinder is necessary. Installation of the complete unit between the grinder pump and the work necessitates only two flexible hose connections. No extra pump, electrical work, plumbing, valves or by-passes are required.

Transparent Rustproofing

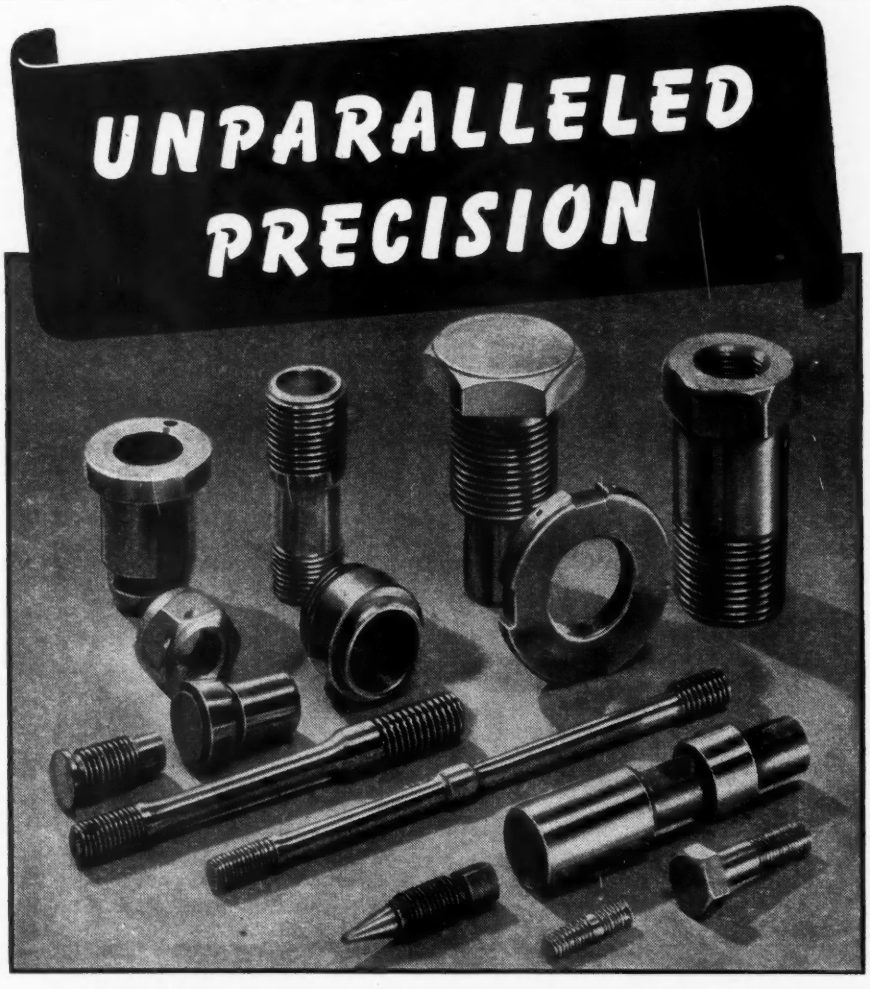
A rustproofing coat, called "Clear Coat," that dries to a hard, transparent film, has been brought out by Nox-Rust Chemical Corp., Chicago, Ill. It is recommended by the maker for use on angle bars, bits, drills, castings, machined surfaces, pipe and pipe fittings, tractor parts, wheels, wire, sheet steel, etc. Numbered markings on the metal show clearly through Clear Coat.

Nox-Rust is available in light, medium and heavy grades. All three have high adhesion to metal and will show no cracking or peeling in any temperature and even if metal is bent after application. The heavy grade is for metals that will have some outdoor use. A field for the light grade is as a coating under paint. All numbers are said to be excellent for rustproofing where high-grade protection and transparency are desired and where non-removability may be a factor.

Celanese Announces a New Plastic

Development of a new plastic, Forticel, whose unusual properties should greatly enlarge the field of applications of cellulosic plastics was disclosed by Celanese Plastics Corp., a division of Celanese Corp. of America. Made

(*Turn to page* 70, *please*)



For years The Chicago Screw Company has been manufacturing Screw Machine Products with unparalleled precision.

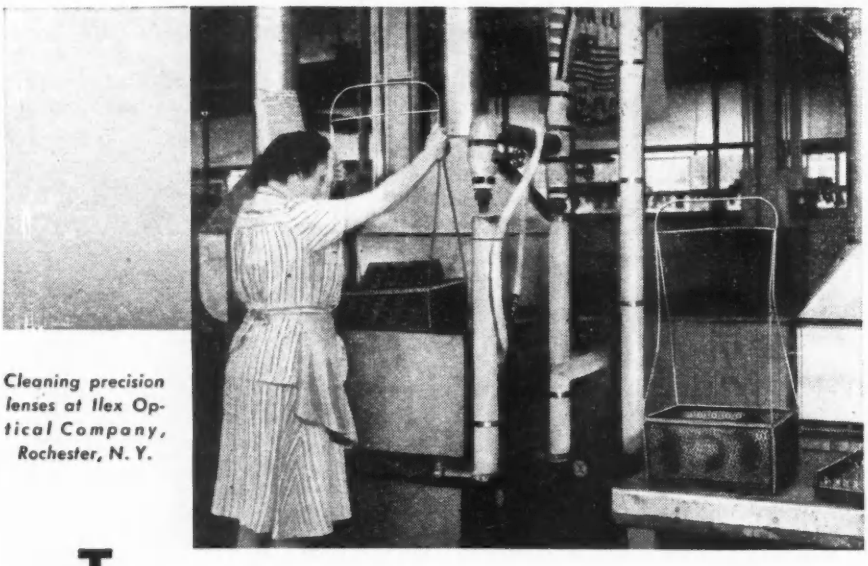
In the "Chicago Screw" plant are hundreds of machines. Some are standard, some are specially built; all are designed to do the best job on your particular requirements. There are ample up-to-the-minute facilities for Milling, Drilling, Boring, Broaching, Thread Rolling and Grinding, Hydrogen Brazing, Electronic Heating, etc... facilities to produce not just small parts—not just large parts—but any special screw machine part in any size from ⅛″ to 5″ diameter in any type of raw material.

You will find it worthwhile to get in touch with "Chicago Screw's" matchless facilities for making precision-made Screw Machine Products.

THE CHICAGO SCREW CO.
1026 So. Homan Avenue • Chicago 24, Ill.

PERM-A-CLOR

IS USED FOR THE TOUGHEST VAPOR DEGREASING JOBS



Cleaning precision lenses at Ilex Optical Company, Rochester, N. Y.

THE removal of blocking pitch from precision lenses is one of the toughest applications for solvent vapor degreasing. Practically every known hazard that would contribute toward solvent breakdown is present.

For many years PERM-A-CLOR has been used not only for high-speed production cleaning of precision lenses, prisms and many other parts in the optical industry, but in every industry where critical operating conditions exist. In every application where aluminum is processed, or high humidity is prevalent, or where mixed-metal runs are being cleaned, it is economical to specify PERM-A-CLOR—the solvent with the utmost stability.

★

For your most critical applications, specify PERM-A-CLOR.

For applications requiring average stability—TRIAD

DETREX SOLVENTS ARE STOCKED AT:

Akron, Ohio	Fort Wayne, Ind.	Portland, Ore.
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Charlotte, N. C.	Los Angeles, Cal.	Saginaw, Mich.
Chattanooga, Tenn.	Lockland, Ohio	San Francisco, Cal.
Chicago, Ill.	Milwaukee, Wis.	Seattle, Wash.
Charlestown, Mass.	Minneapolis, Minn.	Somerville, Mass.
Cincinnati, Ohio	Nashville, Tenn.	South Bend, Ind.
Cleveland, Ohio	New Haven, Conn.	Springfield, Mass.
Dallas, Texas	Newark, N. J.	Syracuse, N. Y.
Dayton, Ohio	Niagara Falls, N. Y.	Tulsa, Okla.
Denver, Colo.	Oakland, Cal.	Toledo, Ohio
Detroit, Mich.	Philadelphia, Pa.	Waterbury, Conn.
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DETREX Corporation

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Solvent Degreasers - Metal Parts Washers - Processing Equipment - Industrial Cleaning Chemicals

from cellulose and propionic acid, Forticel was a laboratory plastic for years until Celanese succeeded in developing a new process for producing propionic acid from natural gases in commercial quantities and at reasonable prices. The process is in operation now at the company's new chemical plant at Bishop, Texas. While present production is limited to a small pilot plant, the company anticipates attaining a steady moderate production of Forticel by January next to be followed by large scale production just as soon as plans already approved for this purpose can be carried out.

As a thermoplastic, the most economical and satisfactody process for making Forticel into finished articles is by injection and extrusion molding. Finished products are said to be characterized by an unusual surface lustre, and brilliant mold finishes are obtained without any mechanical polishing whatever. Moreover, the molding cycle can frequently be reduced by Forticel. In certain instances this gain in molding time is equivalent to a 25 per cent increase in production, it is said. The superior plastic flow quality of Forticel in the molding operation insures virtually invisible weld lines, where two streams of plastics meet in the die.

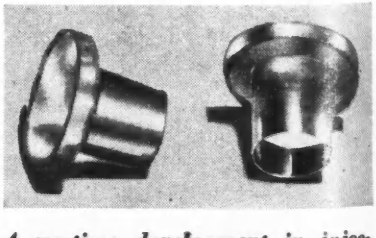
Explosive Rivet for Peacetime Production

An explosive rivet especially adapted to meet the needs of peacetime mass production methods was announced by E. I. du Pont de Nemours & Co. This improved rivet is the latest development in the explosive type of "blind" fasteners used extensively by the aircraft industry during World War II. They are fastened in place by firing a small explosive charge within the shank of the rivet.

Retaining basic features of previous types, the improved design eliminates the necessity for close tolerance drilling and provides rivets which will accom-

(*Turn to page 72, please*)

Plexiglas Shields Protect Chrome During Plating



A wartime development in injection-molded plastic that promises to have many peacetime uses is the crystal-clear Plexiglas plating shield such as the ones illustrated here, made by Standard Molding Corp., Dayton, Ohio, for use to protect the chrome around the holes in aircraft struts. Because of its extreme inertness in plating solutions, Plexiglas is particularly adaptable to this purpose

HELPS SOLVE HEAT PROBLEMS THAT GO WITH SUPERCHARGING

There's more heat to be disposed of when an engine is supercharged—heat generated because, without any increase in engine size or weight, an engine is putting out more power. This heat must be carried off through cylinder walls, cylinder heads and pistons.

Aluminum's superior thermal properties make it a natural for this assignment. Cylinder heads and pistons of Alcoa Aluminum distribute that heat quickly and uniformly, thus preventing destructive temperatures.

Manufacturers' designs of cylinder heads and oil-cooled pistons, developed with the assistance of Alcoa engineers, assure maximum efficiency and safety in the operation of supercharged engines. The benefits gained by this experience are yours for the asking. Write ALUMINUM COMPANY OF AMERICA, 2110 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

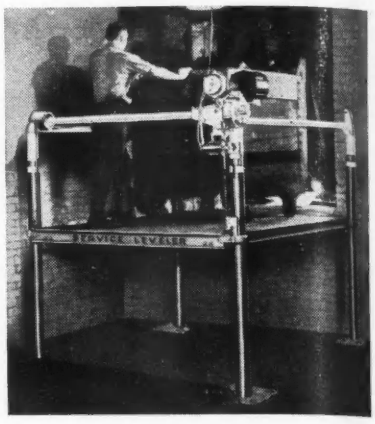
modate a wide range of metal thicknesses. These features are in direct contrast to those of the explosive rivets supplied to aircraft manufacturers where precision tolerances and a wide variety of lengths were required.

After explosive rivets are in place one person applies the tip of an electrically heated iron to the rivet heads. Heat fires the explosive charge within approximately two seconds. The shank of the rivet is expanded to completely fill the hole and a barrel-shaped head is formed on the "blind" end to lock the rivet securely in place. The strength of these rivets is only slightly less than that of conventional solid rivets.

These improved rivets are now provided in ⅛-in., 5/32-in. and 3/16-in. diameters, and will be produced in additional sizes. They are made of various materials including several aluminum alloys, brass, copper, mild steel and Monel metal.

Material Handling Aid

Three handling problems are said to be safely and economically solved with the Service Leveler, new product of Service Caster & Truck Division of Domestic Industries, Inc., Albion, Mich., and Somerville, Mass. Raising finished goods from floor level to loading platform is one, from shipping floor to motor truck is another, while the lowering of raw materials from car to floor is the last of the three handling assignments which the Leveler can do faster, safer and more economically.

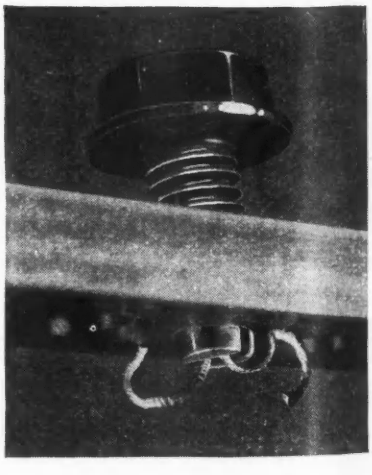


Service Leveler

Basic safety feature of the Service Leveler is the hoisting and control mechanism. The fully enclosed power unit and motor are positive under all operating conditions. A free wheel brake controls the lowering of the platform at a steady predetermined speed. A centrifugal governor is always present as an emergency safety brake.

Tap Screw Cuts Threads in Any Material

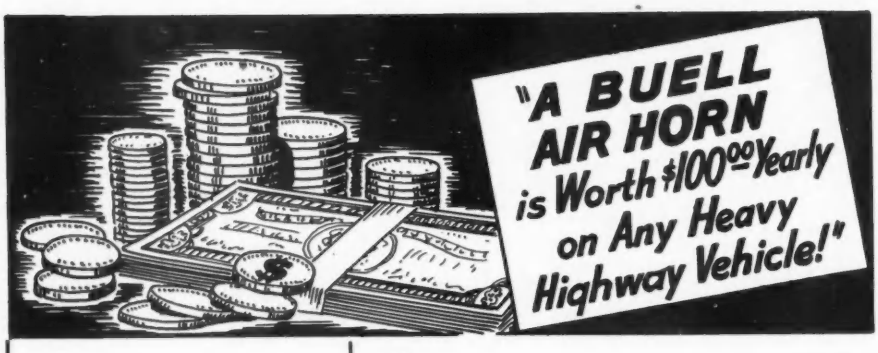
The new Holtite "Tap" screw, developed by Continental Screw Co., New Bedford, Mass., combines the cutting action of a tap with the economy of a screw. The slot, corresponding to the flutes of a tap, in end of screw provides two balanced cutting edges and a chip reservoir. In action, the curled chips cut from material are pushed ahead of the screw in the same manner as chips are pushed ahead of a spiral pointed tap.



Holtite "Tap" screw

The Holtite "Tap" screw is not intended to replace the sheet metal screw in normal applications. It does, how-

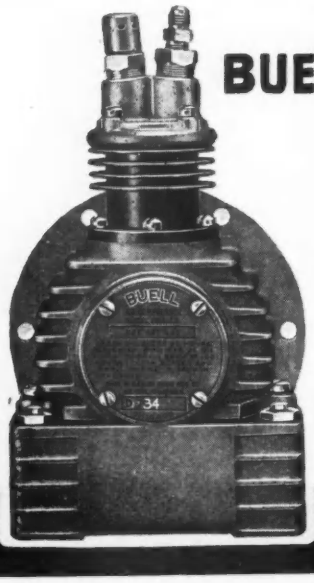
(*Turn to page 76, please*)



- Buell Air Horns are tops in warning signal efficiency.
- Installed as original equipment on many Trucks and Buses.
- They reduce maintenance costs by decreasing stops, starts and slowdowns.
- All records prove that they save tires, brakes, clutches and gears.
- Cut gas and oil consumption.

Sturdy, Powerful Toned Horns— Built for Service!

A Buell Air Horn is worth $100.00 yearly on any heavy highway vehicle. With a Buell the driver has greater security, maintaining a steady cruising speed. Slowing a 20 ton load from 50 MPH to 30 MPH means destroying a lot of energy thru brake lining and *tires*. It is replaced by burning more gasoline, increasing load on engine, and *tires* again, to regain speed. This all costs money. We believe $100.00 yearly is a low estimate. Then remember a Buell will last more than 10 years. How would you rate a $100.000 investment that earned $100.00 yearly for 10 years. Ask the man who has a Buell.



BUELL AIR COMPRESSOR

- Used on Passenger Cars, Trucks, Buses, Boats and Planes.
- Small and compact in size . . . efficient and powerful in action.

Buell engine-driven compressors supplied air to operate air brakes in thousands of R.C.A.F. aircraft. Only a combination of quality and precision workmanship could meet the requirements of this type of service.

Designed for compactness and light weight, they are far more efficient and powerful than their size indicates. Let us prove their adaptability to your needs.

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2975 COTTAGE GROVE AVE., CHICAGO 16, ILL.

PAN AMERICAN'S 204 passenger transoceanic super-ship being built by Consolidated-Vultee dwarfs even the great B-29 bomber. 25 miles of wire, 150 electric motors, hundreds of switches and outlets and half a ton of radio equipment, will demand the best in electrical insulating materials and NON-metallics such as C-D makes.

Perfected for the War Planes of yesterday... Ready for the Peace Planes of today!

NEW materials . . . NEW techniques . . . NEW know-how . . . yesterday available only for high priority war planes and equipment—NOW you can have them, to apply to your current design and production problems. Whenever you have a problem where you think NON-metallics may be the answer . . . let C-D technicians study it with you. The proper application of these new C-D materials, techniques, and know-how may help you speed-up reconversion, improve product performance, cut production costs. Wire . . . phone or write our nearest office . . . or send us your blue prints.

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DILECTO—A Laminated Phenolic.

CELORON—A Molded Phenolic.

DILECTENE—A Pure Resin Plastic Especially Suited to U-H-F Insulation.

HAVEG—Plastic Chemical Equipment, Pipe, Valves and Fittings.

The NON-Metallics

DIAMOND Vulcanized FIBRE

VULCOID—Resin Impregnated Vulcanized Fibre.

MICABOND—Built-up Mica Electrical Insulation.

Standard and Special Forms

Available in Standard Sheets, Rods and Tubes; and Parts Fabricated, Formed or Molded to Specifications.

Descriptive Literature

Bulletin GF gives Comprehensive Data on all C-D Products. Individual Catalogs are also Available.

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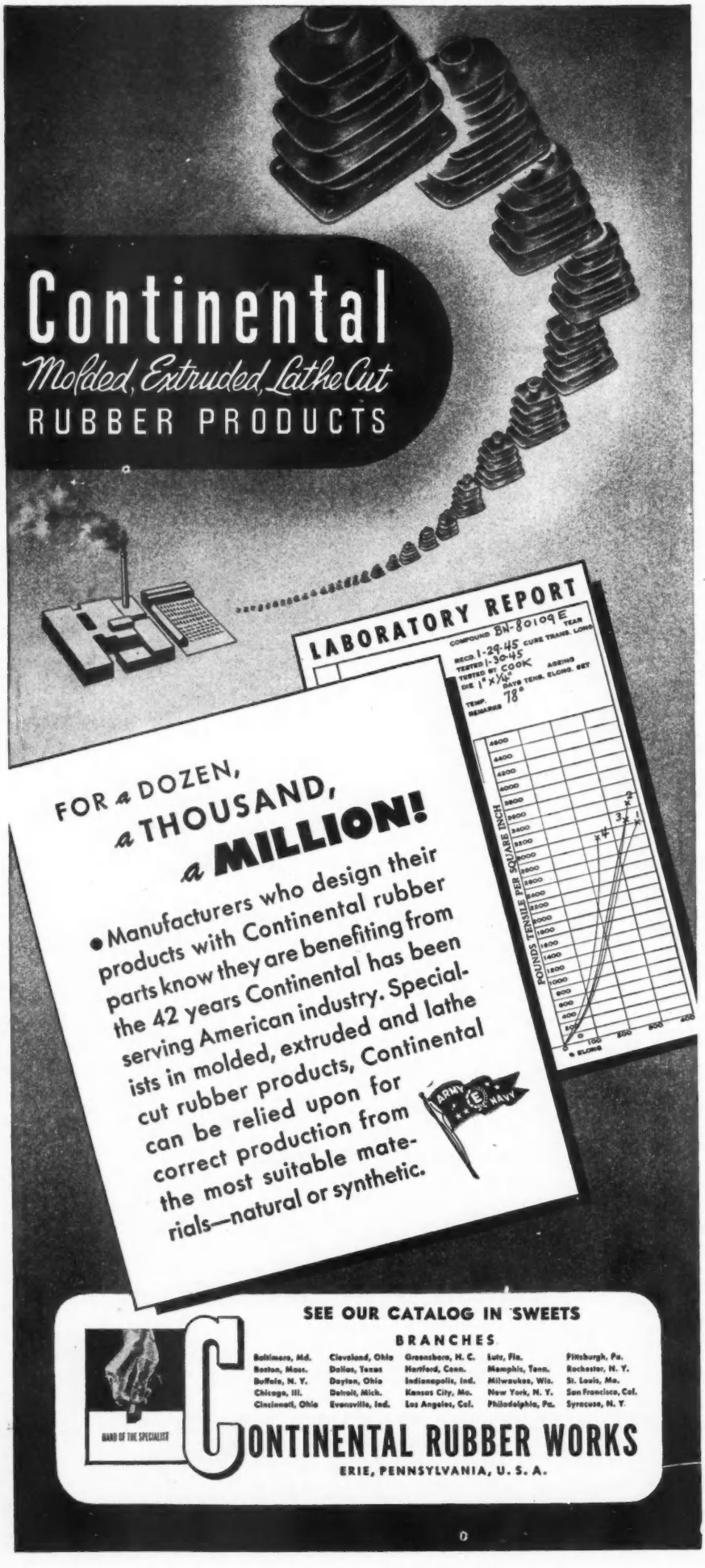
Continental - Diamond FIBRE COMPANY

Established 1895 . . Manufacturers of Laminated Plastics since 1911—NEWARK 2 • DELAWARE


Continental
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RUBBER PRODUCTS
LABORATORY REPORT
FOR a DOZEN,
a THOUSAND,
a MILLION!
• Manufacturers who design their products with Continental rubber parts know they are benefiting from the 42 years Continental has been serving American industry. Specialists in molded, extruded and lathe cut rubber products, Continental can be relied upon for correct production from the most suitable materials—natural or synthetic.
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HAND OF THE SPECIALIST
CONTINENTAL RUBBER WORKS
ERIE, PENNSYLVANIA, U. S. A.

ever, replace them in applications where harder materials, deeper holes, or the need for greater holding power and easier driving make sheet metal screws less satisfactory than desired. The "TAP" screw can be used in applications where these factors have made it impossible to use sheet metal screws which, being harder than the material into which they are driven forcibly, displace the material by a cold forging action to form a mating thread. As a result standard sheet metal screws cannot be used in certain types of materials such as cast iron, brittle or weak materials (some types of plastics). Because the Holtite "Tap" screw cuts its own thread it is not subject to these limitations.

Holtite "Tap" screws are furnished with slotted head or Holtite-Phillips recessed head, in all standard and special head shapes.

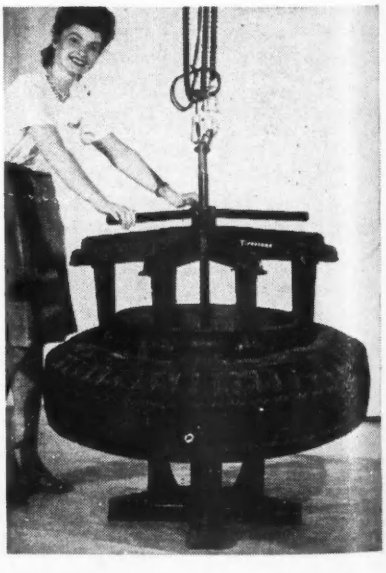
Truck Tire Demounting Unit

A truck tire demounting unit that can separate the most tightly fitting tire from its rim with a force as great as 25,000 lb., has been originated by the Firestone Tire and Rubber Co. Production of the new tool is now under way at one of the Firestone steel products plants in Akron.

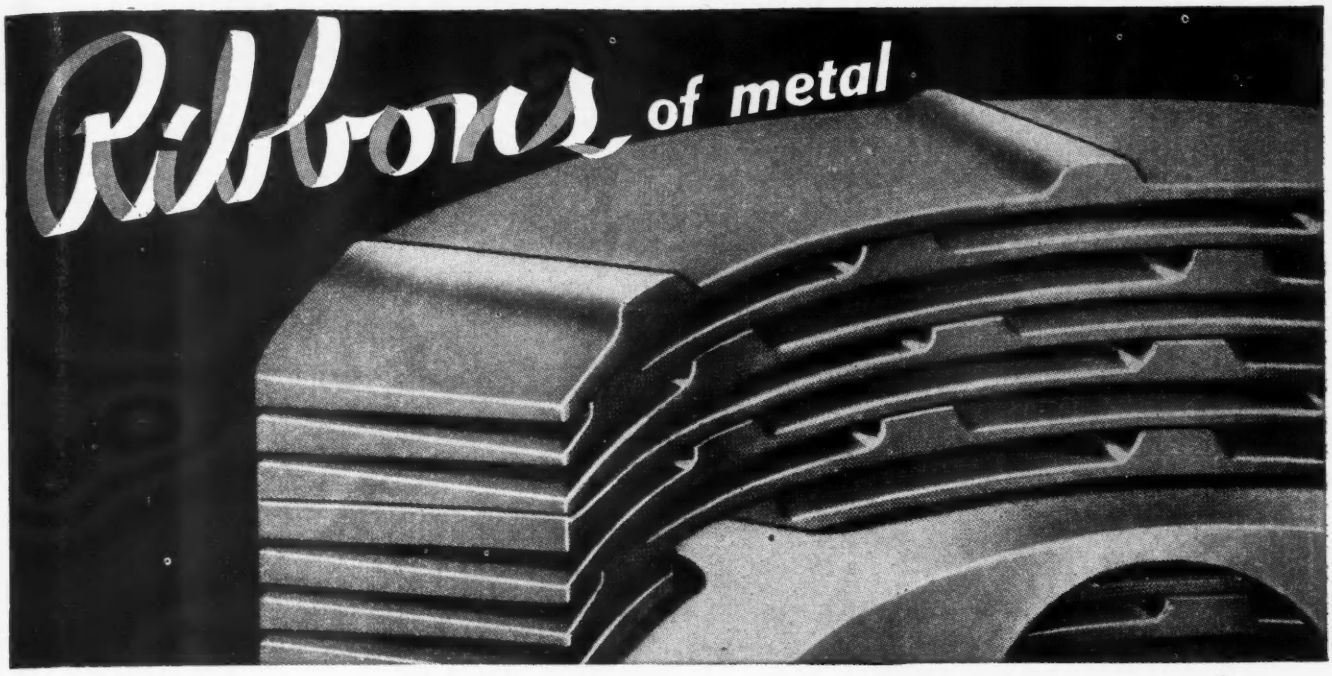
Adjustable to truck tire rims 15 to 24 in. in diameter, the tool consists of a base on which the mounted tire is laid, and an eight-legged cast iron "spider" which beneath a three-armed jack hangs from a central screw shaft above. The spider, adjustable to different bead diameters, has curved, wedged feet with hinged "ankles" which act as levers against the tire bead.

In operation, the spider, suspended by a pulley hoist, and the base are adjusted to the tire rim. The mounted tire is then centered on the base and the spider is lowered until the screw shaft meets a screw hole in the center of the base, in which it can be locked by a quarter-turn.

(*Turn to page 78, please*)



Firestone tire demounting unit



..to entrap particles or to separate liquids!

Not woven wire cloth...not fabric... but *ribbons of metal*...do the filtering in an element developed by Purolator.

The principle is entirely new. The enlarged section (above) shows its construction.

A metallic ribbon is wound edgewise on a cylindrical perforated frame. At regular intervals, supporting projections occur. Their height determines the degree of filtration. Elements can be made with filtering gaps as small as 0.0005"; as large as 0.025".

In operation, the filtrate passes between the ribbons, leaving its solids on the outer edges. Clogging of the passages is prevented by the ever-decreasing cross-section of each ribbon.

Once Purolator had worked out the design, there still remained the big problem of finding a metal that would make the design practicable.

Such a metal had to be ductile and workable—to permit forming of the intricately-shaped ribbons.

It had to resist corrosion—for the slightest corrosion would destroy the precision spacing of the gaps.

It had to be hard—so that edges of the thin ribbons would neither burr nor wear under the abrasion of a doctor blade with which some models are equipped to remove accumulated sludge.

By using Monel, all three demands—*and more*—were met!

Monel is corrosion-resistant . . . hard . . . workable. The ridged, tapered ribbons can be formed with no intermediate annealing. *(The next best material had to be annealed three times before reaching the final shape.)*

Thus, once again, Monel made a difficult job possible. Investigate Monel and all the INCO Nickel Alloys whenever *you* plan trouble-free operation in the equipment you design or buy. The International Nickel Company, Inc., 67 Wall St., New York 5, N. Y.

MONEL ELEMENTS INSURE EFFICIENT FILTRATION

These new Purolator elements made of Monel are used for filtering hydraulic fluids, gasoline and lubricating oils.

Shown at left above is a filter designed primarily for hydraulic systems actuated by emergency hand pumps. This unit operates either in the pressure or suction line. Filter gaps in the Monel elements are spaced at .003".

The smaller filter at the right, also intended for use in a hydraulic system, has a filter gap of .003" to protect a .021" orifice against clogging.

For detailed information on metallic ribbon filtering elements adapted to other types of hydraulic controls, or to gasoline or oil lines, write Purolator Products, Inc., 744 Broad Street, Newark, N. J.

NICKEL (INCO TRADE MARK) ALLOYS

MONEL* • "K" MONEL* • "S" MONEL* • "R" MONEL* • "KR" MONEL* • INCONEL* • "Z" NICKEL* • NICKEL

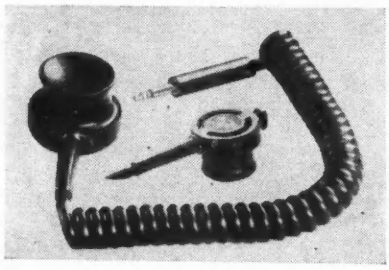
Sheet...Strip...Rod...Tubing...Wire...Castings...Welding Rods (Gas and Electric)

*Reg. U. S. Pat. Off.

Fitted between the bead and the rim flange, the wedged feet, pressing downward as the jack arms are turned, gradually and evenly loosen the tire. Any localized binding resulting from accumulation of rust can be overcome by driving the locked side down with a mallet and tire tool. The tire, pried loose, drops off the rim.

Hand-Held Microphone and Retrax Cord

The Aviometer Corp., New York, N. Y., has improved its hand-held microphone. Where reports or requests involving figures or symbols must be faultlessly transmitted to remote points, this compact hand-held carbon microl phone assembly, usable on all radio and interphone systems, give 8 milliwat output for input of 100 dynes per square centimeter (normal close-speaking voice).



Aviometer microphone

An acoustic low frequency cutoff and response to 5000 cycles guarantees performance under extreme noise conditions. The plunger, with recessed finger grip, moves smoothly against a strong detent spring, giving clear disconnect warning. The unit is spray-prof and equipped with flexible rubber "Retrax" cord, reinforced at connections, which extends 40 in. on less than a 2-lb pull.

Electrode for Machinable Welds in Cast Iron

A new welding electrode for making machinable welds in cast iron has been introduced by the International Nickel Company's new electrode plant at the Bayonne Works.

Besides this new electrode, designated by the trade name Ni-Rod, another new electrode also has been developed. This is the "133" 80-20 nickel chromium electrode for welding the Inconel side of Inconel clad steel. In addition six other electrodes are being produced at the plant for arc welding. Gas welding rod and uncoated wire for submerged melt welding are produced at the Huntington Works of the company. The six types of electrodes are designed for Monel, Inconel, nickel, "L" Nickel, "K" Monel, 70-30 cupro-nickel, and the various clad steels.

Curved Clearances Cut by New Tool Grinder

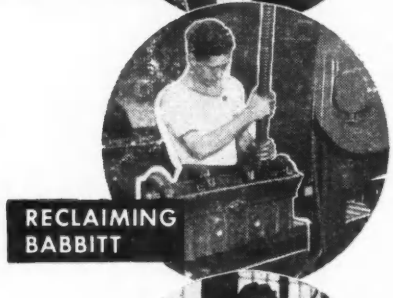
A "curved clearance," providing maximum support behind the cutting edge of taper reamers and all other types of profile cutting tools, is produced by a new tool grinder, manufactured by the Joshua Hendy Iron Works, of Sunnyvale, Cal.

The "Standard" Hendy-Larsson reamer and cutter grinder is equipped with a 30 in. sine bar for the grinding of taper reamers to accuracies of .0001 in. or closer. The "Junior" model with a 20 in. sine bar, is an attachment unit

(*Turn to page* 80, *please*)

Hendy-Larsson Cutter grinder

HOW TO SPEED PRODUCTION *with* SPENCER VACUUM



Any production man with imagination can apply Spencer Vacuum to improve or increase production, in a new way.

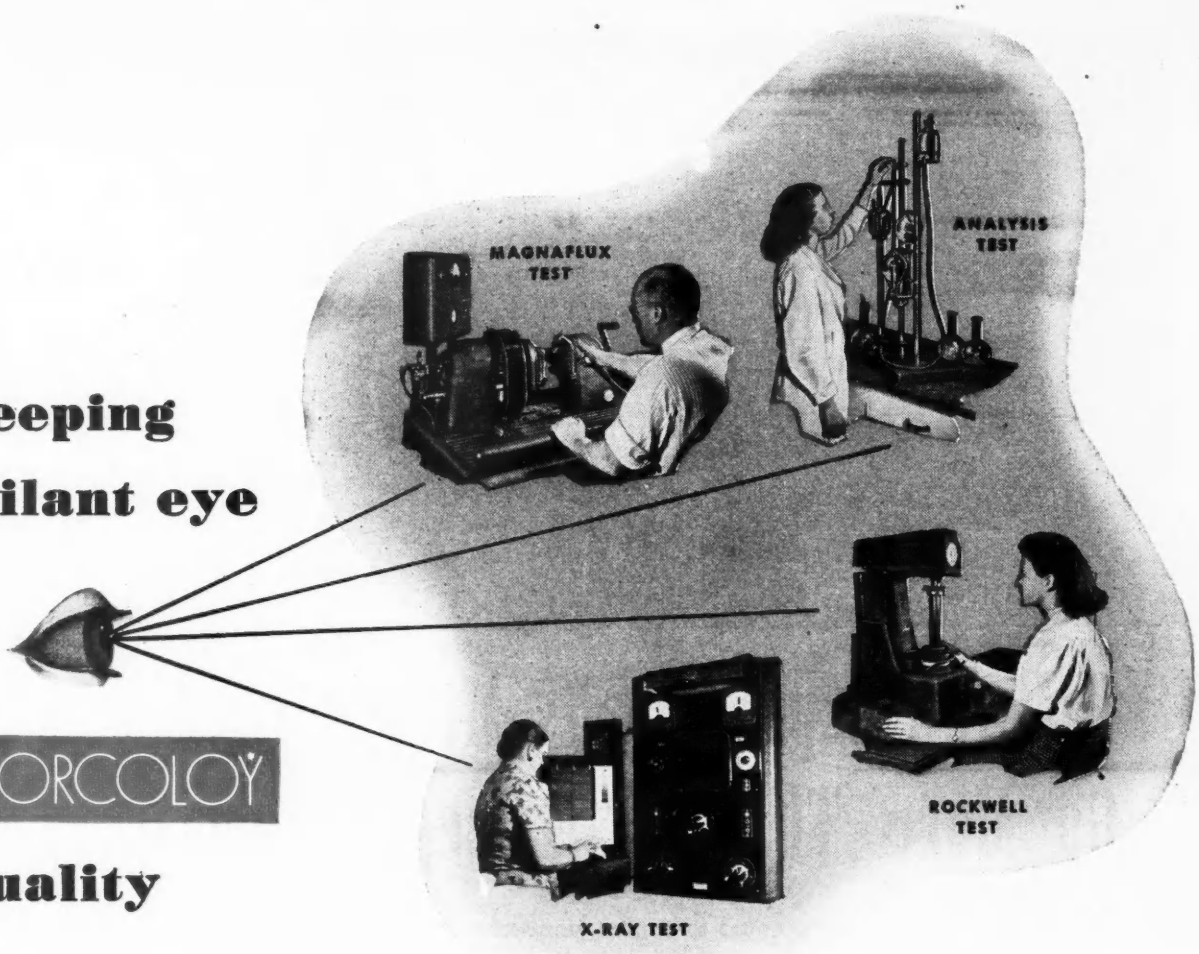
Four examples are shown on this page. Air is removed from paper bags before sealing. Bench operators pull dust out of instruments and parts instead of blowing it all over the plant. An engine manufacturer recovers babbitt on the production line, and enamel dust is removed from stencils.

The same Spencer Vacuum machine, portable or stationary, cleans floors, walls, ceilings and machinery better, faster and at less cost. Bulletins on request.

276-C

SPENCER HARTFORD VACUUM CLEANING

THE SPENCER TURBINE COMPANY, HARTFORD 6, CONN.



keeping a vigilant eye on BORCOLOY* quality

. . . *to bring you tools* consistently *good*

THE metal-working industry knows that **BORCOLOY** tools cut metal faster and cheaper. And — what's more important — the next **BORCOLOY** tool can be depended on to be infallibly like the last — and *for two good reasons.*

First, **BORCOLOY** tools are produced in one of the most modern cutting-tool plants in the country, under advanced, scientific methods of manufacturing control.

Secondly, each **BORCOLOY** tool is subjected — *individually* — to a series of exacting tests. Each tool is checked for uniformity of composition, for size, shape, and finish; checked again for hardness, magnafluxed and X-rayed to detect infinitesimal surface or sub-surface cracks. Every tool bearing the **BORCOLOY** name is guaranteed to be of the highest quality.

That's why you can count on *consistently* higher production between tool grinds from tools of **BORCOLOY** . . . the centrifugally-cast ferrous alloy that combines the superior hardness of heat-treated steel (up to Rockwell C-71) with the "red hardness" of cobalt and the wear- and abrasion-resistance of boron.

There's a grade of **BORCOLOY** for every machining operation in the middle-range fields:

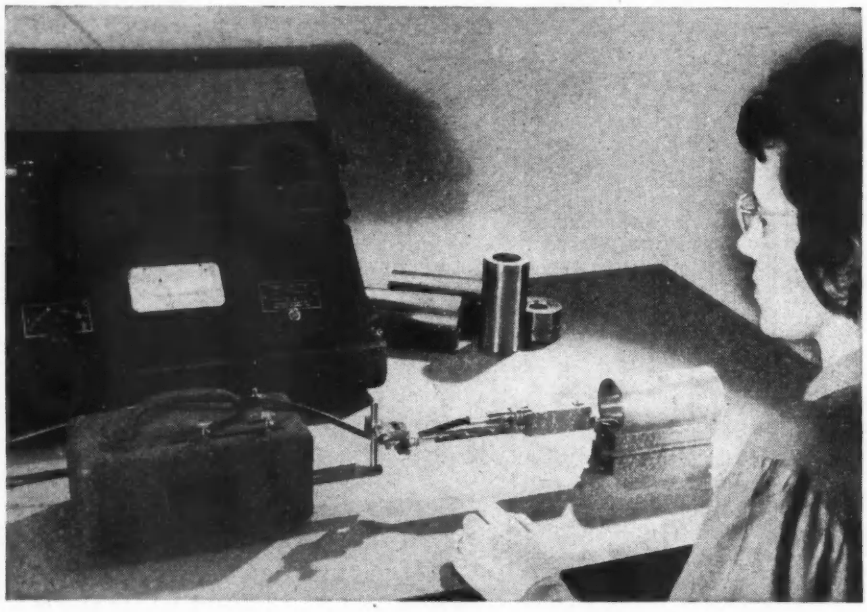
Grade 5 — Where wear-resistance is the principal factor
Grade 6 — For maximum hardness
Grade 7 — For maximum "red hardness" on fast-cutting production jobs.

For a new idea of cutting speed and long tool life, try **BORCOLOY** tools. Distributors in your area can supply you with **BORCOLOY** tools — tipped or solid from stock.

*Registered Trade Mark

GENERAL AIRCRAFT EQUIPMENT, INC.
Tool Division; South Norwalk, Conn.

Branch Offices: Newark Detroit Los Angeles
Canadian Sales: General Aircraft Equipment of Canada, Ltd., Montreal, P. Q.



Postwar Improvements Must Go More Than Skin-Deep!

The American public is going to expect wonderful things from American industry now that the war is over. These expectations go more than skin deep. Inside modern, "stream-lined" cases and cabinets must be greatly improved motors and mechanisms, home appliances will have to run quieter—wear longer—and require a minimum of repair and service.

Meeting these performance requirements involves careful control of surface finish. The surface roughness of a machined part affects its appearance, its resistance to wear, its fatigue strength, its fit with other parts, and in many other ways.

The use of Profilometer equipment provides the most efficient and accurate method of controlling surface roughness. A staff of Profilometer Field Engineers is available to talk with you concerning the surface-finish control work in your plant. Our Field Engineer will call on you at your convenience and without obligation. Profilometer Catalog on request.

Illustrated above—Profilometer setup for production measurement of roughness on sleeve-bearings and other inside-diameter parts.

Profilometer is the registered trade-mark indicating Physicists Research Company's brand of surface-roughness gaging instrument.

PHYSICISTS RESEARCH COMPANY
343 SOUTH MAIN STREET . ANN ARBOR, MICHIGAN

that will fit on any standard cutter grinder.

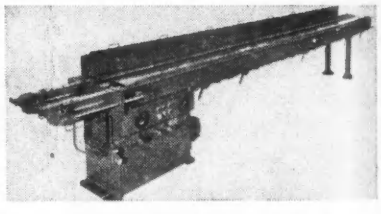
Three adjusting dials eliminate the necessity of checking clearances and reduce set-up time to a minimum. Using them, the operator sets the machine to the proper cutter diameter, adjusts the clearance slide, and dresses the cutter wheel. Grinding to the desired clearance may then proceed. A carbide-tipped locating finger, syncronized with the dresser, prevents any chance of error, and the finger moves automatically with the abrasive wheel as it wears down. Clearances, once established can be duplicated indefinitely.

Tensile Strength Tester

A tensile strength tester recently developed by the John S. Barnes Corp., Rockford, Ill., is adaptable to testing the tensile strength of modulus of elasticity of a wide variety of metal products, such as chains, wires, cables, bar stock, etc. This machine may also be used to give a definite set to chains.

The Barnes tensile strength tester is 25 ft. long, and can accommodate chains and cables of any length up to 20 ft. Adjusted platforms are provided to eliminate say, thereby insuring maximum accuracy in testing. Two 4 in. bore by 8 in. stroke low friction cylinders provide initial test loads up to 1500 lb. Final test loads may be as great as 15 tons.

One chain or cable can be under test while another is being prepared. The



Barnes tensile strength testing machine

operator is protected from possible injury due to chain breakage by a safety cover over the chain or cable under test.

A timing device automatically removes the test load. Elongation of the metal under test is automatically registered on verniers on the front of the machine in convenient reading position. Verniers may be reset to zero at any time during the test, thus permitting comparative readings for any portions of the test cycle. Verniers retain their maximum readings until they are reset.

Warmer Daylight Fluorescent Lamps

Fuorescent lamps which furnish a new and warmer-appearing daylight color, known as "4500 degree white," soon will be in production, according to the Westinghouse Lamp Division, Bloomfield, N. J.

Made possible by developing a new formula for making and mixing the

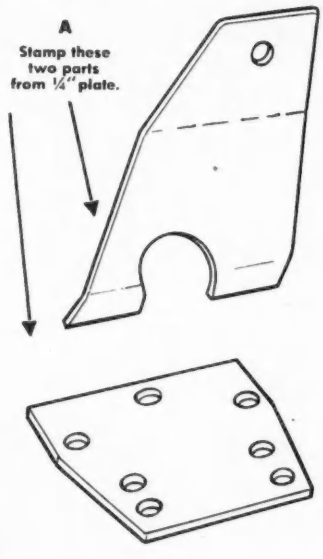
(*Turn to page* 108, *please*)

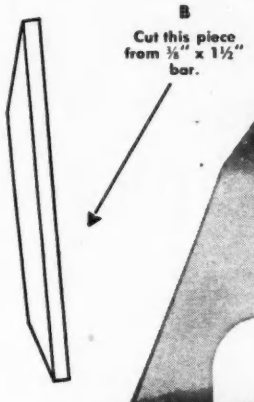
"TEACH"—*he says*

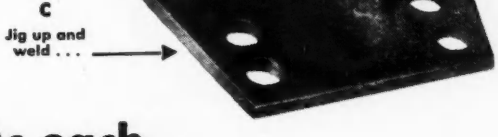
HERE, PRESIDENT CAMACHO, is education for any man who wonders why he cannot sell his product, made by outdated procedures, against a competitive product which is arc welded *and come out with a profit.*

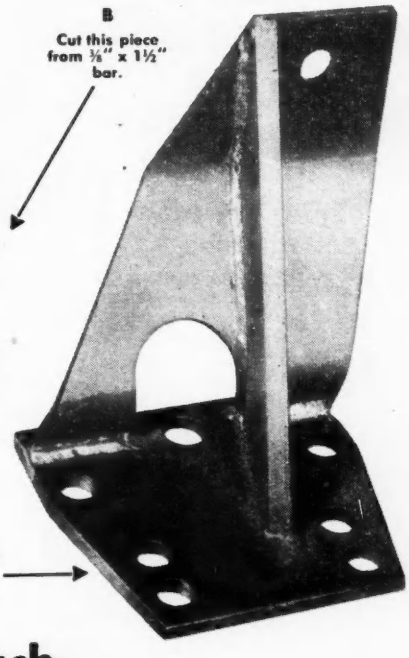
The A-B-C's of Welded Design

COSTS $1.24









COSTS 64c

RESULT: Saves 60c each

THIS bracket is typical of many parts being changed over to welded design to cut costs, and to produce a stronger, more rigid and lighter product . . . one that can be constantly improved easily and quickly.

Here is the A-B-C solution to many of your problems of today. The Lincoln Engineer will gladly help you get the results *you* want. Studies in Machine Design free on request. Ask for them on your business letterhead.

THE LINCOLN ELECTRIC COMPANY • Dept. Z-1 • CLEVELAND 1, OHIO

America's greatest natural **recourse**

ARC WELDING

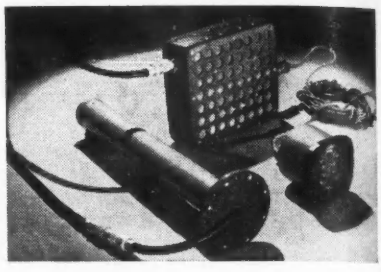
New Products for Aircraft

Electronic Fuel Gage

The Simmonds Pacitor fuel gage, made by Simmonds Accessories, Inc., New York, N. Y., is now being delivered for installation on civilian aircraft.

The Simmonds Pacitor gage has been used on more than twenty types of combat aircraft. Its basic principle makes use of a change of the electrical capacity of a condenser when the dielectric changes from liquid to air, these changes being recorded on a conventional cockpit dial, the reading usually being in terms of pounds, or weight.

The Pacitor circuit includes three basic elements: the tank unit, or condenser, which essentially comprises simple parallel plates; the power unit which contains the electric and electronic components; and the cockpit indicator, or dial. These units are interconnected by standard electrical fittings and may be arranged in a circuit to meet the requirements of any type of installation. Accurate totalizing of the

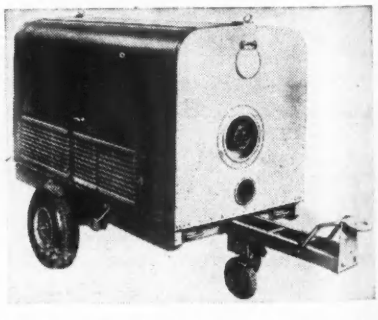


Simmonds Pacitor gage

readings of many irregularly shaped tanks, located in the wings and fuselage, is one of the further advantages of the Pacitor system. There are no moving parts in the Pacitor circuit, except for the indicator pointer in the cockpit dial.

Portable, Air-Cooled Generating Set

Ground testing of B-29 bombers at advanced bases during the war was made possible by use of a portable electric power plant produced by Bardco Manufacturing and Sales Co. of Los Angeles, Cal. Prior to the development of the motor generator units, necessary testing of the big bombers' electrical



Bardco portable electric power plant

equipment had to be done under actual flight conditions due to the high drain on the Superforts' electrical supply systems.

Designed in cooperation with the Army Technical Service Command, Bardco's power plant provides electric power for routine and special tests of control motors and other electrical units as well as power for small tool operation, use of trouble lights and similar equipment. The model GD15C24 delivers 15 kilowatts, 28½ volts, 528 amp of direct current from two AAF type R-1 aircraft generators. The generators are driven by a 4-cyl, air-cooled,

(*Turn to page* 86, *please*)

Tannewitz

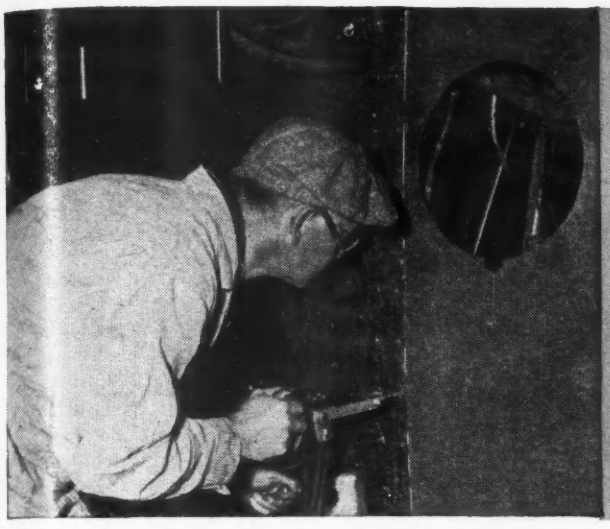
the DI-SAW with Extra SPEED AND EXTRA STAMINA

Did you ever hear of a transmission going haywire on a TANNEWITZ DI-SAW? No, neither did we, though we have been making die saws for a good many years. And that's just typical of the superior construction of the entire machine. It can take the severest kind of use and always be ready for the next job. Moreover the standard model has larger wheels than customary in machines of this type — a full 24 inches — for greater traction, straighter, faster sawing and more production. Get the complete facts and you'll discover why TANNEWITZ DI-SAWS always show the best possible return on an investment in equipment of this kind. Write for "DI-SAW" Bulletin.

OTHER MODELS TO HANDLE WORK OF PRACTICALLY ANY SIZE

make available the tremendous savings of inside and outside sawing, filing and polishing on dies, jigs and other work too large to handle on the standard machine. Bulletin on request.

THE TANNEWITZ WORKS
GRAND RAPIDS 4, MICHIGAN



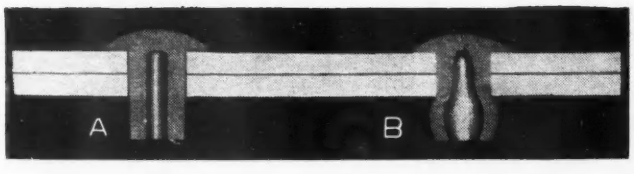
These fast-working fasteners

help simplify design and speed production

You've heard of Du Pont Explosive Rivets. During the war, aircraft builders used them extensively in constructing Corsairs, Fortresses, Marauders, and many other famous planes. They permitted simplification of designs and helped eliminate riveting bottlenecks.

Today, Explosive Rivets of a new, improved design* are ready for countless applications in peacetime industries: automotive, refrigeration, housing, air conditioning, heating and ventilating, radio, boat building, railroad car manufacturing, household appliances, metal furniture and others.

EXPLOSIVE RIVETS ARE EASY TO USE



Cross-section photo above shows an unexpanded Explosive Rivet (A) inserted in hole. Rivet shank contains a small explosive charge. Application of an electrically heated Du Pont Riveting Iron to Rivet head fires the charge. The Rivet shank expands, filling the hole completely and forming a barrel-shaped head that locks the Rivet (B) securely in place. Result: a strong, tight joint. Setting Explosive Rivets is a simple two-step operation requiring from 2 to 4 seconds. Anyone can do it. No finishing operations are necessary because of the neat, smooth heads.

Write for Complete Information Today. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department A-2, Wilmington 98, Delaware.

SIZES AND TYPES AVAILABLE

Head Types	Standard Diameters	Grip Lengths
Modified Brazier and Countersunk	1/8" 5/32" 3/16"	1/8" (for thicknesses up to 1/8") 1/4" (for thicknesses from 1/8" to 1/4") 3/8" (for thicknesses from 1/4" to 3/8") 1/2" (for thicknesses from 3/8" to 1/2")
Other head types and diameters will be produced		

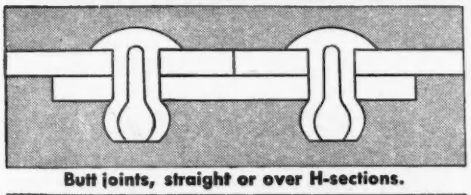
MATERIALS

Explosive Rivets are made of various materials:

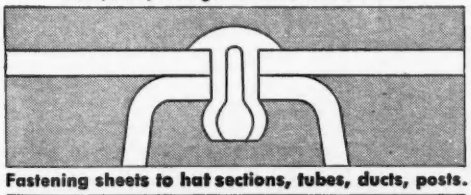
Aluminum alloys: 17S-T, 52S, and 56S (for magnesium sheet work), Brass, Copper, Mild Steel, Monel Metal and others.

*The improved Explosive Rivet has a straight cavity extending the entire length of the shank. This new design eliminates necessity for close tolerance drilling and provides wide grip ranges. It makes this Rivet particularly adaptable to mass production methods.

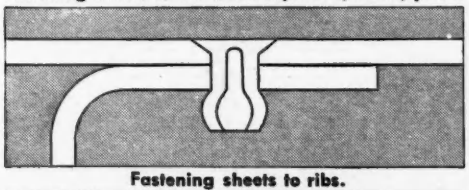
Note these typical applications



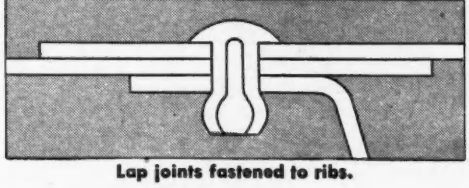
Butt joints, straight or over H-sections.



Fastening sheets to hat sections, tubes, ducts, posts.



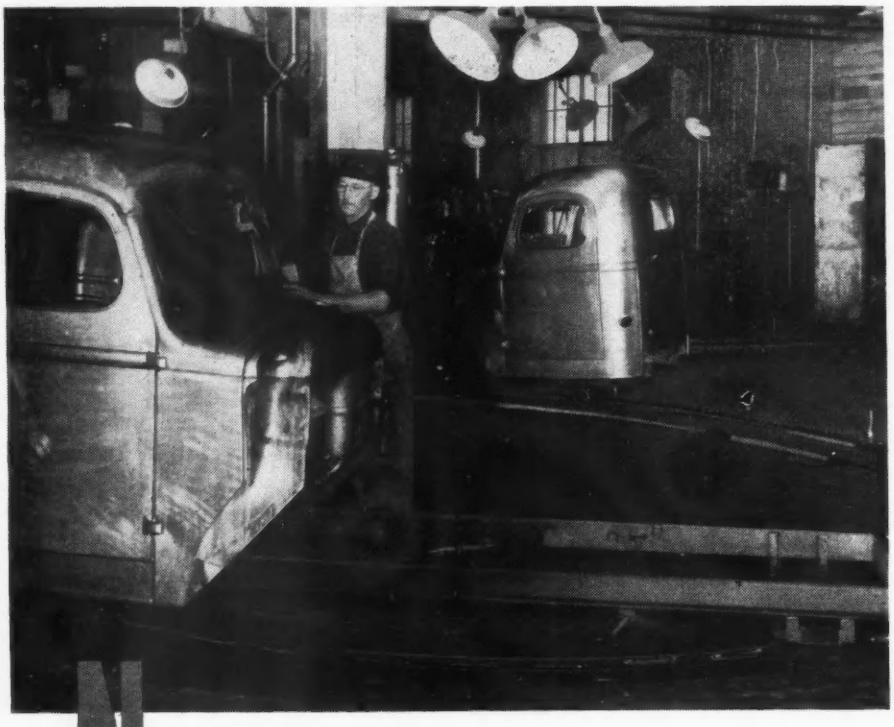
Fastening sheets to ribs.



Lap joints fastened to ribs.

DU PONT
REG. U.S. PAT. OFF.

DU PONT EXPLOSIVE RIVETS



NOW IT CAN BE TOLD!

YES, the part that Alvey-Ferguson helped to play on the winning team of "Ordnance-Industry" can now be told!

Materials and products had to be handled at new speeds . . . with "do or die" efficiency! So Alvey-Ferguson was privileged to cooperate with automotive and aviation engineers everywhere in the design and manufacture of completely coordinated A-F conveyor systems that helped break all production records!

★ **MORE PRODUCTION AT LOWER COST**

Typical of the completely coordinated conveyor systems engineered by Alvey-Ferguson is this installation: Here an A-F towing conveyor moves dollies on which truck cabs are placed. The photo pictures only a small part of the complete "indoor transportation system"—one of the longest truck assembly lines in the world!

The experiences acquired in solving the unusual handling problems of war-time have greatly enriched our forty-four years of "know-how" in the conveyor field. May we cooperate with you in showing how a completely coordinated A-F Conveyor System will cut your costs—boost your production? Write today.

THE ALVEY-FERGUSON COMPANY

Offices in Principal Cities — 29 DISNEY ST., CINCINNATI 9, OHIO

★ ★ ★

Affiliated Corporation

The Alvey-Ferguson Company of California
P. O. Box 396, Vernon Branch, Los Angeles 11, Calif.

CONVEYING EQUIPMENT

Alvey-Ferguson

METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

68-hp Continental aircraft engine through a step-up gear train.

Although the power plant was designed especially for use with the B-29s, the possibility of present peace time applications in dissimilar fields was not overlooked. Mounting pads and drive shafts for the installation of alternators instead of generators were provided. The ready mobility of the power plant is another factor bespeaking many commercial applications.

Plastic Coating for Nascelles and Propellers

Corrosite, a new and practically impermeable air-drying film, completely resistant to most acids, all alkalies, and many chemicals, has recently been developed by Baker Synthetics, Inc., New York, N. Y. The new coating (a combined thermoplastic and thermosetting film) is impervious to de-icing fluid, salt air and salt water.

Corrosite will bond to practically any clean surface, including old paint. It is said to offer greater abrasion resistance than can be achieved with any other surfacing material without the use of heat. It is electrolytically impervious, a three-coat application on any metal will completely eliminate any deterioration caused by electrolytic corrosion.

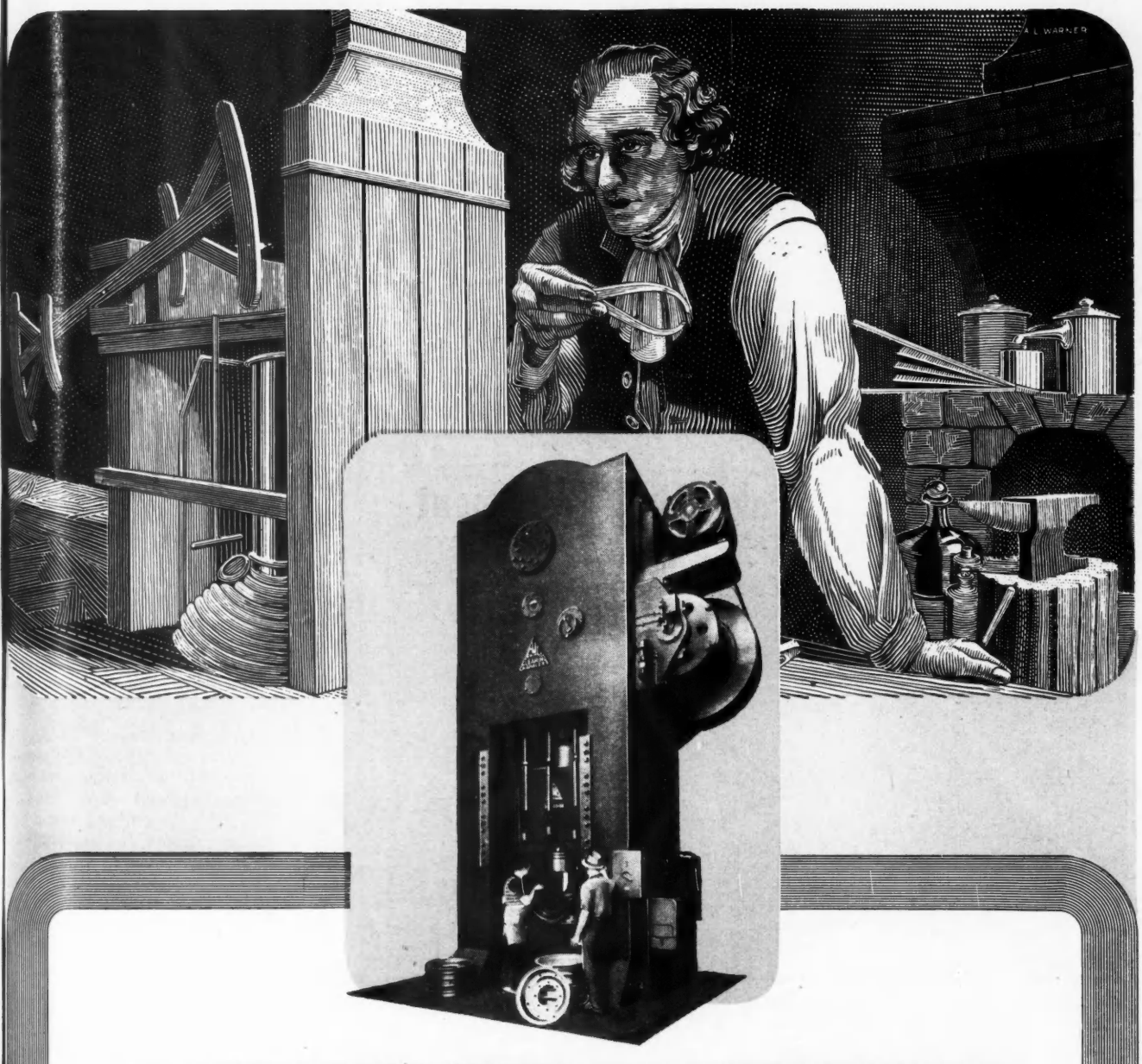
No prime or intermediate coats are required for Corrosite, and, prior to application, no special or unusual surface preparation is needed. Corrosite clear weighs 9.0 lb per gal and covers up to 450 sq ft. Successive coats can be applied with only one hour's drying time between them—permitting a three-coat application in a single day.

A-L May Take Over Two Hangars at Willow Run

Electric Auto-Lite Co. is reported considering taking over two aircraft hangers and a parts building at the Willow Run bomber plant and concentrating operations of a number of its smaller plants in the Middle-West there. Plants which probably would be affected by such a development would be those now located at Fostoria, Ohio; La Crosse, Wis.; Bay City, Mich.; Indianapolis, Ind., and possibly units in Toledo. D. H. Kelly, executive vice-president of Auto-Lite, and Byron Fay, production expert, inspected the facilities recently. Kaiser-Frazer Corp. has leased the main assembly building, together with the power plant and administration building, for a five-year period for the manufacture of automobiles.

GM Leases Aircraft Plant

General Motors Corp. has leased an aircraft assembly plant near Kansas City, Kan., for a five year period, according to the War Department. The plant will be used for the future assembly of automobiles.



HE BUILT BACK-SEATS FOR PREDECESSORS

You could have bought a practical steam engine in 1736, the year James Watt was born—yet Watt is known as the father of modern steam power. Although he did not invent the steam engine, James Watt increased its efficiency, power and versatility so much that his engines made it profitable to scrap even the latest models of other types.

A similar picture is presented by the history of presses for the forming of metals. Before Clearing improved design and manufacturing methods, technical restrictions seriously limited press application. By providing faster work cycles, much greater pressures and the ability to work to closer tolerances, modern Clearing Presses became the leaders in their field.

Whatever your production plans, you should investigate how and where Clearing Presses make them more effective. There's every chance that Clearing's recommendations can point the way to lower costs for you as they have already for so many other progressive companies. Write today to CLEARING MACHINE CORPORATION, 6499 West 65th Street, Chicago 38, Illinois.

CMC CLEARING

MECHANICAL AND HYDRAULIC PRESSES

FOR SUCH OPERATIONS AS DRAWING • BLANKING • FORMING • FORGING

CLEARING ★

Fairchild Semi-Trailer

(*Continued from page* 30)

The trailer's weight saving of 51 per cent was made possible by using high-strength aluminum alloys, by installing a lighter refrigerating unit, and by designing the trailer in such a way that every part contributed to its structural strength. There is no chassis assembly; the all-aluminum body and chassis are integrated, the chassis channels forming part of the trailer's floor. Stresses are distributed throughout the entire framework, including the skin of corrugated sheet aluminum.

For the suspension system, rubberized fabric bellows, inflated with air, were substituted for the usual steel springs at a saving of 300 lb. Engineered by the Firestone Tire and Rubber Co., the air springs are about 8½ in. in diameter, convoluted, and also serve as pneumatically-controlled shock absorbers. Air within the four shock-absorbing springs is maintained at [illegible] to 80 lb pressure, depending on [illegible] amount of load to be carried.

The air system communicates wi[illegible] an air reservoir through a valve. T[illegible] size of the air reservoir used with ea[illegible] air spring determines its operati[illegible] characteristics. Thus a suspension e[illegible] gineer can select the particular rese[illegible] voir size to best meet the characte[illegible] istics of the trailer, passenger car, bu[illegible] truck or even airplane upon which [illegible] is to be applied, depending upon spe[illegible] of operation, weight of vehicle and [illegible] variety of other conditions. Chara[illegible] teristics of the air spring as a sho[illegible] absorber can be varied to meet spe[illegible] fied conditions by restricting the a[illegible] passage between the bellows and t[illegible] air reservoir. This adjustment can [illegible] made by means of inertia, velocity [illegible] remote manually-operated valves [illegible] desired.

Each air spring valve consists of [illegible] disk arranged to permit free flow [illegible] air from the bellows to the reserv[illegible] but to restrict return flow, as desire[illegible] through ports. In this manner, t[illegible] energy available for recoil damping [illegible] represented by the difference betwe[illegible] the rates of the bellows and the rese[illegible] voir size.

The simple installation of the a[illegible] spring on the trailer is made possib[illegible] by two longitudinal beams welded [illegible] the Army's standard axle. A sma[illegible] metal disk at the end of each bea[illegible] provides the support for the dual-typ[illegible] air springs. A similar plate is a[illegible] tached to the frame of the trailer an[illegible] the four small metal air reservoirs ar[illegible] located in convenient spots.

Insulation, a major problem in de[illegible] signing a refrigerated trailer, wa[illegible] solved by attaching an interior she[illegible] of aluminum to wood stringers an[illegible] filling the void between the exterio[illegible] and interior shells with Fiberglas[illegible] Rubbatex, a light, cork-like insulatin[illegible] material of synthetic rubber, was use[illegible] for flooring, with additional strengt[illegible] provided by a top covering of corru[illegible] gated aluminum sheet.

About 2000 lb was eliminated by in[illegible] stalling a 700 lb refrigerating unit re[illegible] cently developed by the United State[illegible] Thermo Control Co. of Minneapolis[illegible] Placed in the front of the trailer, thi[illegible] unit forces a large volume of cold ai[illegible] to the rear, across the top of the carg[illegible] of food. To obtain maximum eff[illegible] ciency the cold air must be recircu[illegible] lated. This problem was solved b[illegible] attaching diagonal beads to the interio[illegible] shell of aluminum from floor level [illegible] the maximum height of cargo. Th[illegible] beading prevents cargo from packin[illegible] up tight against the walls of the r[illegible] frigerator, and serves to direct th[illegible] cold air forward, along the sides [illegible] the cargo; once forward, it joins th[illegible] new stream of cold air to make a[illegible] other round trip. Additional circula[illegible] ing beneath the cargo is provided b[illegible] the corrugation of the flooring.

EXTRA LONG WEAR...EXTRA SAFETY
In Every Single Brake Lining Segment
AGING THE MIX
The aging cycle is important. It is clocked to the minute to assure the uniformity of each succeeding batch.

Because of **GRIZZLY's** *Exclusive Asbestos–Friction Compound*

This compound developed during 29 years of "stop" engineering retains the same co-efficient of friction through its entire life . . . life that is lengthened materially by the greater serviceable thickness. It is moulded upon a strong wire grid back under hundreds of tons of pressure. Such qualities make Grizzly "the finest product of the brake lining industry!" Send for free book, "Building UP to a Name". Grizzly Manufacturing Company, Paulding, Ohio.

"Bear in Mind"

GRIZZLY

REG. U. S. PAT. OFF.

BRAKE LINING

Why Speed Nuts are First

with Production Men

NOTHING LOCKS LIKE A SPEED NUT

Only SPEED NUTS provide a COMPENSATING thread lock and a SELF-ENERGIZING spring lock. As the screw is tightened the two arched prongs move inward to lock against the root of the screw thread. These free-acting prongs COMPENSATE for tolerance variations. Compression of the arch in prongs and base creates a SELF-ENERGIZING spring lock. These two forces combine to definitely prevent vibration loosening.

PRODUCTION men who actually use them really appreciate the ease with which SPEED NUTS are applied. They'll tell you that SPEED NUTS start easier, tighten down faster, and eliminate fumbling around with hard-to-handle lock washers.

Production men also will tell you how much time is saved by using any of the self-retaining types of SPEED NUTS. They merely snap these fasteners into bolt-receiving position by hand, instead of welding or riveting cage nuts in place. Moreover, these self-retaining SPEED NUTS provide "float" to compensate for misalignment of clearance holes.

These are only a few reasons why production men prefer SPEED NUTS. But reasons enough for you to investigate SPEED NUTS for your own benefit by writing today.

TINNERMAN PRODUCTS, INC. • 2059 Fulton Road, Cleveland 13, Ohio

In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario
In France: Aerocessoires Simmonds, S. A., Paris
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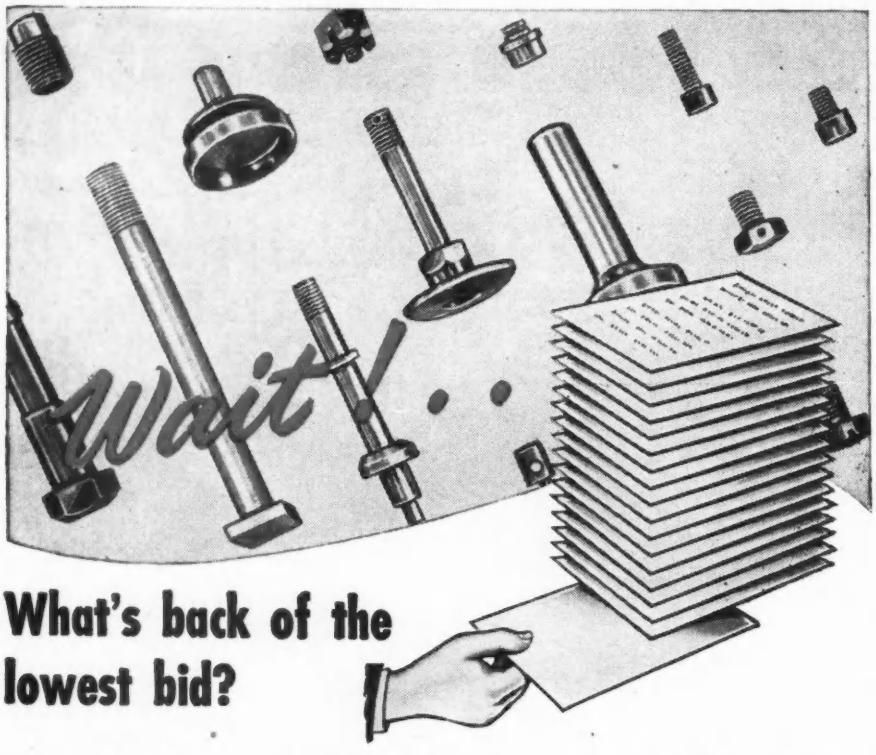
Speed Nuts* PATENTED

*Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS...OVER 3000 SHAPES AND SIZES



What's back of the lowest bid?

It's easier to ask — *and answer* — this question *before* putting out for bids. Because once the bids are in you may find your choice limited.

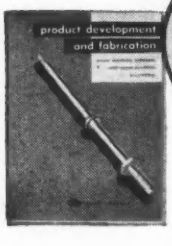
You know how difficult it is to write specifications that cover *every* possible contingency. For instance, it may turn out that you could use . . .

1 *Engineering Service* to work out functional design and material in terms of greater mass production . . .

2 *Production Facilities* to meet unforeseen requirements covering strength . . . accuracy . . . finish . . . while keeping delivery and cost in line with your needs.

3 *Manufacturing Stability*—the sound reputation of a supplier that justifies your choice of source for vital parts.

P-3



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facilities insure

your ultimate satisfaction with your precision parts. And the bid may not be out of line! This bulletin is published in Sweet's File 4m10 for Product Designers. If you prefer that we send you a copy, please request it on your letterhead.

THE CORBIN SCREW CORPORATION

The American Hardware Corporation, Successor

NEW BRITAIN CONNECTICUT

CORBIN

See Sweet's Product Design Catalog, outline of Corbin Products and Facilities

Precision Parts

Output of Cars

(*Continued from page* 42)

ing, and inadequate manpower. Despit an increase of approximately 40 pe cent in labor costs—which represen from 30 to 50 per cent of total costs— there still is a serious deficit in man power. In addition, the unions no are asking for wage increases. Ye prices are generally limited to 194 levels, with a 10 per cent increase al lowed in some cases. A typical illus tration of what is happening to foun dries faced with this situation is th Campbell, Wyant and Cannon foundr at Muskegon, which is reported to b operating at only 10 to 15 per cent o capacity and to have 650 employees a present, compared with a normal em ployment of about 3000. This com pany is a large supplier to automobil companies, and the effect on the sup ply of such components as engin blocks is evident. Captive foundries o the automotive industry probably ca carry the load while production of car is at a low level, but sooner or late contracting foundries must have pric relief if a serious castings bottleneck i to be avoided.

Kaiser-Frazer Corp. and Graham-Paige Motors Corp. have moved into the Willow Run bomber plant and are starting to tool up for production of Kaiser and Frazer cars. According to Joseph W. Frazer, president of both companies, Graham-Paige will occupy one-third of the 2.65 million sq ft of manufacturing space leased from RFC for five years, and Kaiser-Frazer will utilize the balance. Production of the Frazer is expected to start about Feb. 1, and the Kaiser approximately six weeks later.

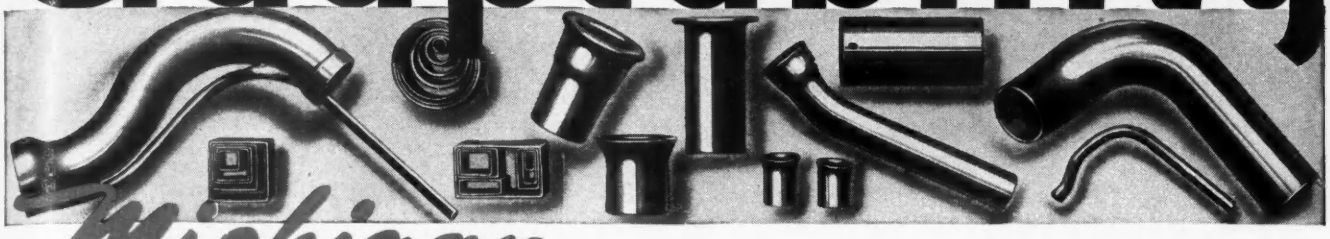
Reconversion of the 52-acre Lincoln plant in Detroit is nearing completion, according to T. W. Skinner, general manager of the Lincoln Division of Ford. Most of the assembly lines already have been installed, and only the delay in obtaining a few parts from outside suppliers is holding up production of completed cars.

A hint of a possible new entry into the automobile field comes from Cleveland, where William S. Jack, president of Jack & Heintz, announced recently that his company might be producing its own car before the end of 1947. He gave no further details, however. He also announced that his company will go into manufacture of a new type gasoline engine. While he did not divulge any details of the new engine, it is understood to be of the horizontally opposed type with slide valves.

W. C. Williams, Jr.

W. C. Williams, Jr., 61, General Motors vice president, died suddenly at Detroit Nov. 2. Mr. Williams joined the Chevrolet division at Tarrytown, N. Y., in 1913, and held various positions with GM until 1940 when he became a vice president of the Corporation.

Adaptability



Michigan Welded Steel Tubing

SIZES: ¼" to 4" O.D.
GAUGES: 9 to 22

Available in commercial mill lengths or cut to specified lengths, shaped and fabricated ready for assembly.

Michigan welded steel tube can be flanged, expanded, cold drawn, fluted, flattened, bent, coiled, upset, beaded, grooved, rolled, spun, threaded, tapered, and shaped to meet every manufacturing demand.

Engineering advice and technical help in the selection of tubing best suited to meet your needs.

Michigan STEEL TUBE PRODUCTS COMPANY

MORE THAN 25 YEARS IN THE BUSINESS

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DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—C. A. Russell, Inc., Houston, Texas—Drummond, McCall & Co., Ltd., Toronto, Canada.

Golden Anniversary of Chicago Times-Herald Race

(*Continued from page* 21)

acting as umpire. The car carried a 600-lb "Chloride" battery manufactured by the Electric Storage Battery Co., and a 1.5 hp Lundell motor. Morris & Salom had been engaged in building electric vehicles of different types for about two years. The larger electric vehicle to compete was the design of Harold Sturges of Chicago, who had built his first vehicle for the World's Columbian Exposition, held in Chicago two years earlier.

The difficulties encountered by the contestants under the road and weather conditions described in the foregoing can be imagined. All of the competing vehicles were equipped with rubber tires—the Duryea and Morris-Salom carried pneumatics — but anti-skid chains and other traction devices had not yet been invented, and much trouble was experienced from slipping of the wheels on the snow. It was fortunate in this connection that all of the gasoline vehicles had their powerplants located close to the rear axles, so that a large proportion of the total weight was supported by the driving wheels, which increased the traction.

Only the Duryea car, driven by J. Frank Duryea, and the Benz, driven by Oscar Mueller, finished the contest. Duryea started at 8.35 a.m. and arrived at the finish at 7.18 p.m., while Mueller, who had started about the same time, came in at 8.53 p.m. Duryea was awarded the first prize of $2000; Mueller, the second prize of $1500. A gold medal was awarded the Morris & Salom electric vehicle, which ran as far as Lincoln Park and then returned.

While the event was referred to as a race, it was in reality an endurance contest, for all of the competing gasoline vehicles had more or less mechanical trouble on the road, which delayed those who finished, and caused others to give up. There was a particularly rough stretch of pavement immediately ahead of the Rush street bridge over the Chicago River, referred to by several of the umpires. The Duryea wagon there broke one of its steering-knuckle arms at the root. This made it necessary for the driver to remove the threaded stub from the knuckle, and then find a blacksmith shop (on a holiday) where he could draw out the arm and then replace it. This caused a delay of 55 minutes. Another stop of about the same duration was caused by trouble with the ignition mechanism. There were some other stops for minor troubles, and the driver once lost his way and had to retrace his tracks.

The crew of the Macy Roger had made a valiant attempt to drive from New York to Chicago. They got as far as Schenectady, N. Y., when they encountered a snow storm, and then decided to ship the machine by freight. This vehicle covered more than three-fourths of the course and was then compelled to withdraw on account of engine trouble. At the time it gave up, at 6.15 p.m., it held second place, being preceded only by the Duryea. The De la Vergne, which differed from the other Benz-type cars in having gear instead of belt drive, quit at an early stage of the race, allegedly because its wheels slipped badly on the snow.

The Morris & Salom was driven as far as Lincoln Park, about 11 miles from the start, two changes of battery being made on the way. The battery, which was in four trays of 150 lb each, was renewed in 5 min the first time and in 7 min the second time, the design being such that contact with the controller was established automatically as the trays were slid into place. From Lincoln Park the vehicle was driven back to the Studebaker Build-

(*Turn to page* 94, *please*)

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AMERICAN COIL SPRING CO.

DESIGNERS AND MANUFACTURERS OF ALL KINDS OF SPRINGS TO MEET YOUR PARTICULAR REQUIREMENTS

COMPRESSION
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TORSION
FLAT
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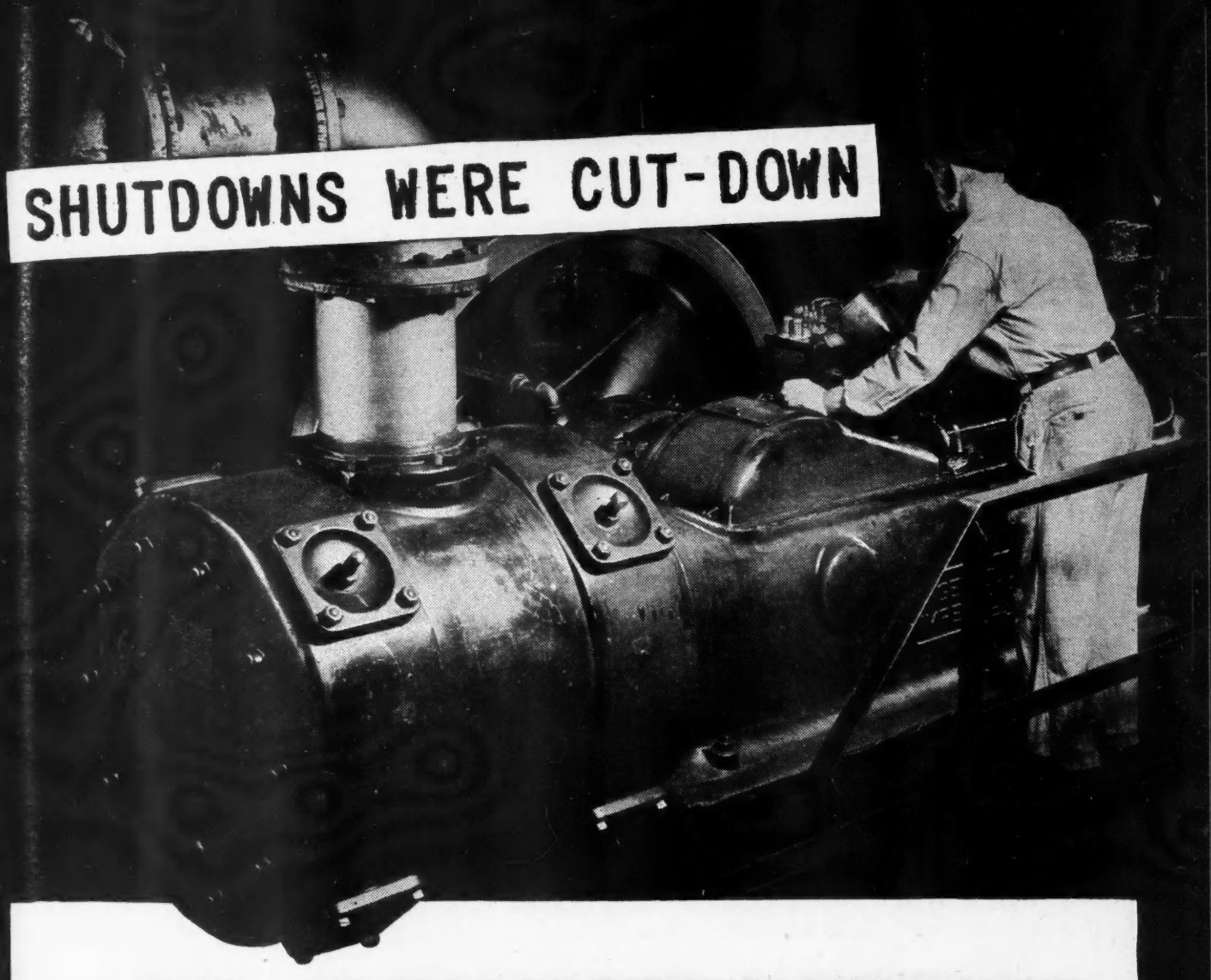
SALES OFFICES: CHICAGO · MILWAUKEE · ST. PAUL · DETROIT



SUN COMPRESSOR LUBRICANT

Ends Quarterly Shutdowns for Carbon-Cleaning in Air-Compressor

Compressor carbon was an unwanted by-product of a big plastics plant. The steam-driven Ingersoll-Rand air-compressor, with mechanical force-feed lubrication, was using a good brand of oil, but produced a "usual amount" of carbon.

Every three months, a shutdown of the air-system was made necessary while compressor-heads were taken off and parts scraped clean.

Carbon disappeared, however, after the management switched to a Sun lubricant. For ten months, with the Sun oil, it was not necessary to clean-out carbon once. Three complete shutdowns were thereby avoided.

Sun compressor lubricants, specially refined to withstand the temperatures and pressures of compression-cylinders, are typical of Sun industrial products. In light and heavy industry . . . in factories, textile mills, mines, tanneries, chemical plants . . . Sun lubricants, fuels, processing oils, and technical products are known for their quality and for the know-how of the men who make them. Call the Sun man near you for information on new products for your industry, or write

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

Sponsors of the Sunoco News-Voice of the Air—Lowell Thomas

SUNOCO

SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY

ing, where the dynamometer tests were made.

On the Sturges electric the field coils of the motor overheated badly and necessitated a number of stops to allow them to cool. This vehicle had to be pushed when starting, because of insufficient adhesion on the icy pavement. It gave up after running about 12 miles, when its batteries became exhausted. Sturges claimed that under normal conditions on good roads he could get 60 miles from one charge.

At the Studebaker carriage repository on South Wabash Avenue, which had been made available for the purpose, Summers and Lundie had built an apparatus for testing motor vehicles, of the type now known as a chassis dynamometer. It was patterned after a similar apparatus installed in the mechanical laboratories of Purdue University for testing locomotives. There was a raised platform onto which the vehicles to be tested could be driven over a ramp. Two wooden pulleys projected slightly above the surface of the platform, and the driving wheels of the vehicle were run onto these pulleys. The pulleys were mounted on a shaft which also carried a friction dynamometer or Prony brake. To hold the car in position on the dynamometer pulleys it was anchored to the framework of the platform, the linkage being so arranged that the pull exerted by the driving wheels on the pulleys (the traction force) was indicated by a platform scale. The original plan was to test the competing vehicles before the race, but actually most of them were tested after the race, including some that did take part in the run. Some of the specifications of the vehicles tested are given in the accompanying table.

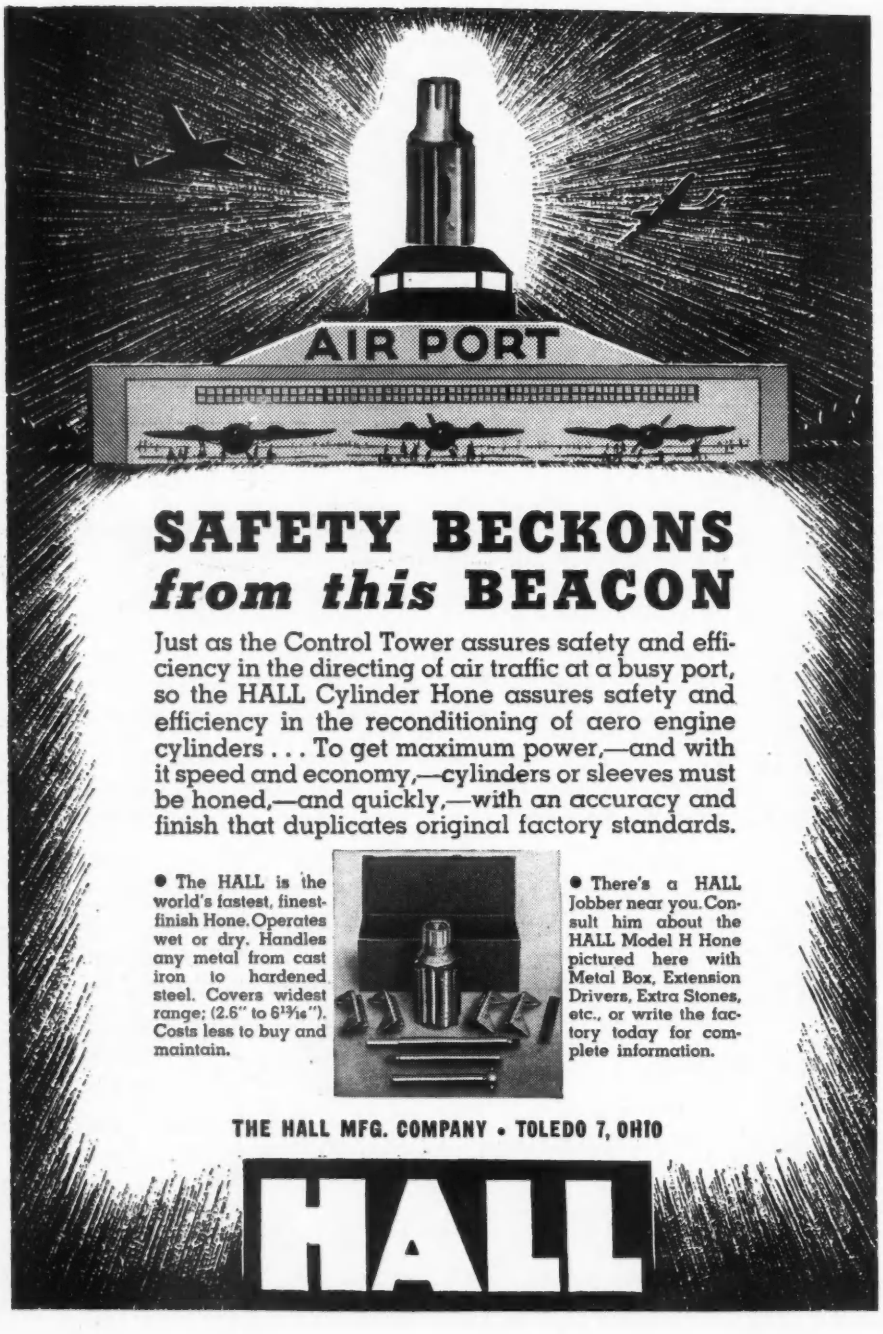
The greatest horsepower developed at the wheel rims was 2.5, by the Roger. This car, like most of the others, lost practically one-half of the power generated by the engine in overcoming friction in the transmission mechanism. Tests were made also to determine the maximum propelling force obtainable, or what might be called the stalling force. It was observed by the testing engineers in this connection that the greatest tractive force measured in the tests (on the Duryea, the lightest of the competing vehicles), was only 187 lb, as compared with the 400 lb which a good horse can exert. On the Benz and Roger vehicles the pull was limited by slipping of the belts. The Lewis wagon (entered by George W. Lewis of Chicago) had a friction-disk drive with which it was possible to obtain almost any speed-reduction ratio desired, and therefore a high torque multiplication, but when it was attempted to measure this high torque, the driving chain snapped. With vehicles with a positive drive the torque and tractive force usually were limited by stalling of the engine.

It is interesting to note that the gasoline used in these dynamometer tests had a sepcific gravity of 0.688 (72 Be.) and in calculating the cost of operation the driving chain snapped. With ve- 2 cents per pound, or about 11 cents a gallon. The gasoline consumption was determined for all of the vehicles tested, and much importance seems to have been attached to fuel costs, though with the high cost of construction of these "hand-built" vehicles and their short life, the item of depreciation must have been at least ten times as great.

It was undoubtedly a fortunate thing for the progress of the movement in this country that the event was won by the only competing gasoline vehicle of American design and construction, the showing of which was particularly creditable when it is considered that it competed against three improved versions of the oldest and then best known of all European makes.

Shown herewith are two drawings of the Duryea engine of the winning car. It was a two-cylinder horizontal engine of 113 cu in. displacement and weighing about 120 lb, which was installed with the cylinder axes parallel with the rear axle. From the crankshaft power was transmitted to a cross shaft by a pair of bevel gears. On the cross shaft there were three spur pinions, each provided with a friction

(*Turn to page 96, please*)


AIR PORT
SAFETY BECKONS
from this BEACON
Just as the Control Tower assures safety and efficiency in the directing of air traffic at a busy port, so the HALL Cylinder Hone assures safety and efficiency in the reconditioning of aero engine cylinders . . . To get maximum power,—and with it speed and economy,—cylinders or sleeves must be honed,—and quickly,—with an accuracy and finish that duplicates original factory standards.
● The HALL is the world's fastest, finest-finish Hone. Operates wet or dry. Handles any metal from cast iron to hardened steel. Covers widest range; (2.6" to 6 13/16"). Costs less to buy and maintain.
● There's a HALL Jobber near you. Consult him about the HALL Model H Hone pictured here with Metal Box, Extension Drivers, Extra Stones, etc., or write the factory today for complete information.
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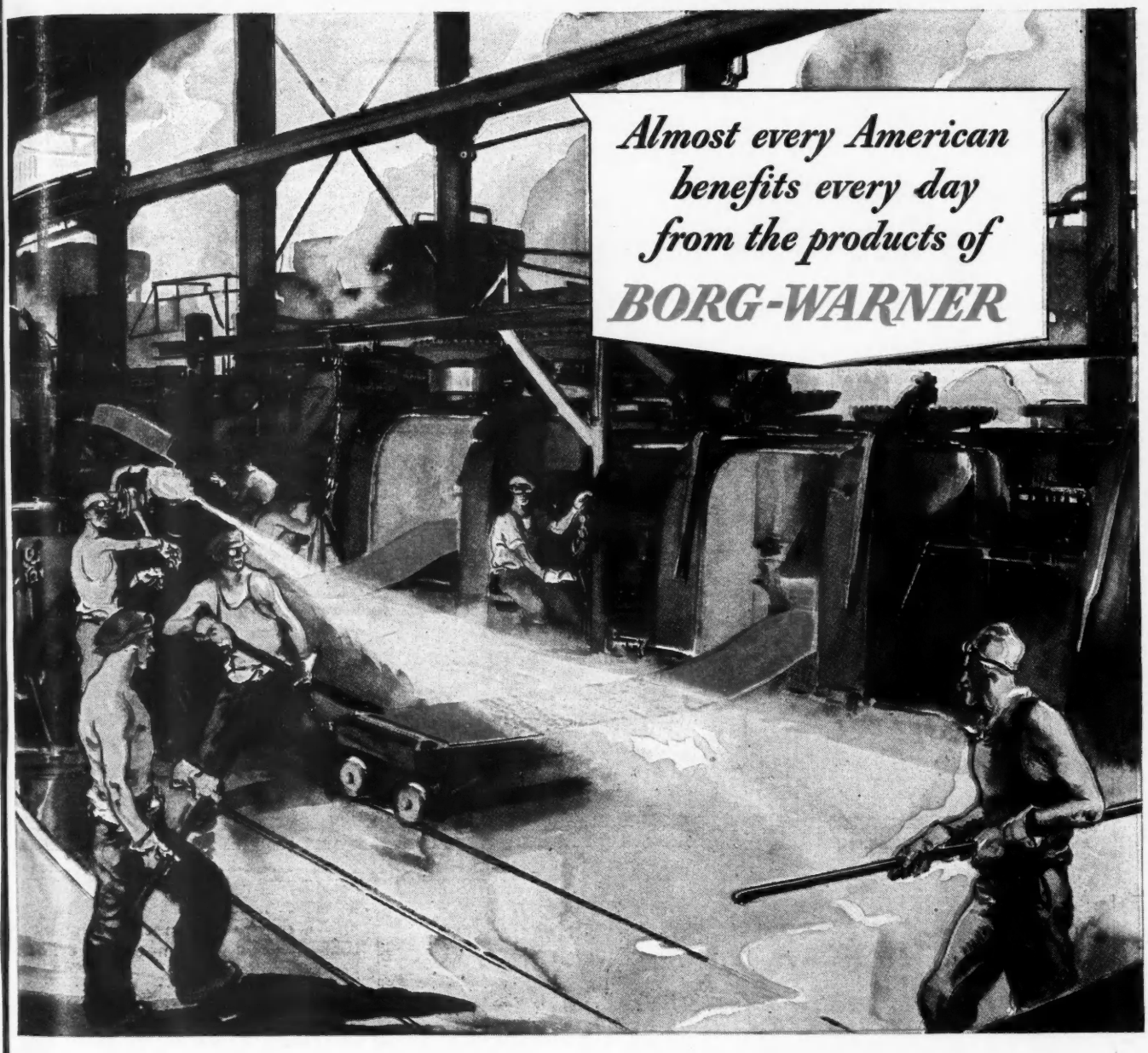


"SWORDS INTO PLOWSHARES" *as painted by James Sessions at the Ingersoll Steel & Disc Division at West Pullman, Illinois. Of the many interesting operations in this plant perhaps the most colorful is this rolling of high-carbon steel used in manufacturing disc plows, disc harrows, cultivators and grain drills. This great Borg-Warner unit is the world's largest producer of tillage steel for the farm implement industry.*

Partners with the automotive and aviation industries from the start, Borg-Warner parts today are serving in 9 out of 10 planes and makes of automobiles.

CLUTCHES AND CLUTCH PARTS • GEARS
UNIVERSAL JOINTS AND DRIVE SHAFTS
TRANSMISSIONS • TIMING CHAINS
CARBURETORS • RADIATORS
PUMPS • AVIATION STEEL

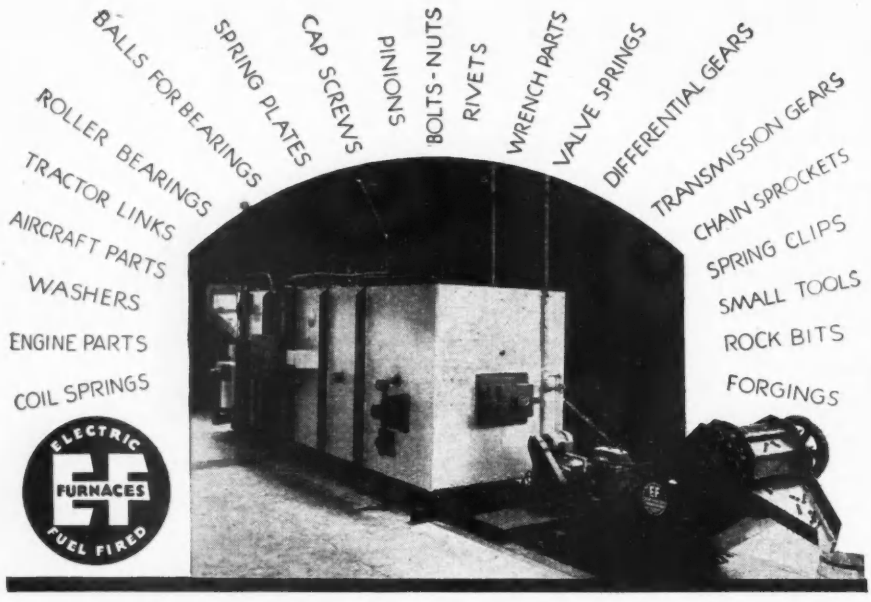
ENGINEERING
B-W
PRODUCTION

Down any country road you drive the chances are that the farm equipment in the fields is using Borg-Warner parts. For the making and shaping of tillage steel are special arts in which the Ingersoll Steel & Disc Division has pioneered for generations.

However, helping the nation to grow its "daily bread" is just one of many fields in which Borg-Warner plays an important role. The products and engineering ingenuity of the 28 plants which compose Borg-Warner benefit almost every American every day. For example, not only are Borg-Warner parts found on 9 out of 10 farms, but also in 9 out of 10 airplanes and 9 out of 10 makes of automobiles. And Norge refrigerators, ranges and washing machines bring better living to millions of homes.

Innumerable great new advances by Borg-Warner will reveal themselves as American industry converts to peace-time production. For, then as now, Borg-Warner's guiding principle, "Design it better, make it better", will work in many ways to bring you ever better products at ever lower costs.

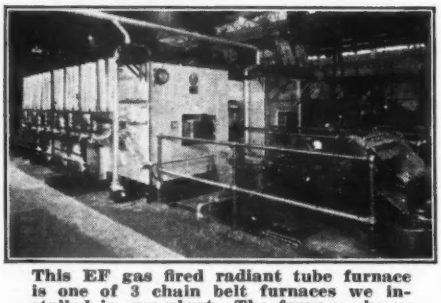
Makers of essential operating parts for the automotive, aviation, marine and farm implement industries, and of Norge home appliances . . . these units form Borg-Warner: . . . BORG & BECK • BORG-WARNER INTERNATIONAL • BORG WARNER SERVICE PARTS • B-W SUPERCHARGERS, INC. • CALUMET STEEL • DETROIT GEAR • DETROIT VAPOR STOVE • INGERSOLL STEEL & DISC • LONG MANUFACTURING • MARBON • MARVEL-SCHEBLER CARBURETER • MECHANICS UNIVERSAL JOINT • MORSE CHAIN • NORGE • NORGE MACHINE PRODUCTS • PESCO PRODUCTS • ROCKFORD CLUTCH • SPRING DIVISION • WARNER AUTOMOTIVE PARTS • WARNER GEAR



For Hardening Small Parts

Uniformly—Scale-Free—Continuously

Charging end of EF chain belt furnace showing cap screws loaded directly on conveyor—no pans or trays are used—100% net material.



This EF gas fired radiant tube furnace is one of 3 chain belt furnaces we installed in one plant. The furnace shown at top of page is electrically heated.

175 to 2000 lbs. per hour

The EF chain belt conveyor furnace is one of the most satisfactory and dependable general purpose heat treating machines built for the continuous, uniform, economical, production heat treatment of miscellaneous small and medium sized parts and products.

These furnaces handle all kinds of parts and products ranging in size from small bolts and springs up to large crawler links for tractors. Hundreds are in operation handling such products as listed above and below.

EF continuous chain belt conveyor furnaces may be oil fired, gas fired, or electrically heated. They are built in several standard sizes with capacities ranging from 175 to 2000 lbs. per hour. Larger or smaller sizes can also be furnished. Any size can be built for using special protective atmospheres for heat treating without scale or decarburization.

Products being treated in EF Chain Belt Furnaces, include:

Sprockets
Cap screws
Bolts and nuts
Gears and pinions
Flat springs
Coil springs
Small forgings
Valve springs
Spring plates
Tractor links
Rivets and washers
Wrench & tool parts
Bearing parts —cups and cones
Machine gun cartridge clips
Aircraft engine parts
Automotive parts
Rock bits, and many other products

The chain belt conveyor furnace is only one of the numerous types we build. Wire, tubing, strip, castings, forgings, stampings, aircraft and automotive engine parts, and many other products are being uniformly treated in other types of EF production furnaces.

Write us regarding your furnace problems. We specialize on building production furnaces.

Send for circulars showing the chain belt and other types of EF production furnaces.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production

clutch, which were in continuous mesh with gears on a second cross shaft, from which latter power was transmitted to the rear axle by chain. By means of a sliding cam rod the three gears could be engaged one after another, and vehicle speeds of 4, 8 and 12 mph obtained at the governed engine speed. Gear changes were effected by an up-and-down motion of the steering tiller.

While the engine operated on the four-stroke cycle—still in common use—it differed from modern engines with respect to the equipment used for carburetion, ignition, lubrication and refrigeration or cooling, and it was equipped with a speed governor, whereas modern passenger-car engines are ungoverned.

No separate carburetor was used. Gasoline from the supply tank was delivered by a plunger pump to a constant-level chamber on top of the cylinders near their outer ends, this chamber being provided with an overflow pipe through which the excess fuel pumped returned to the main tank. From the bottom of the constant-level chamber there was a drilled passage to the spray nozzle located in the air passage ahead of the inlet valve. The latter were of the automatic poppet type, but their lift was under the control of the centrifugal governor mounted on the flywheel. Exhaust valves were poppet valves located in unjacketed pockets at the sides of the cylinders, and were actuated through 2:1 gears and eccentrics. While the cylinders were water-jacketed, the cylinder heads were unjacketed and had a ground fit on the cylinders, so that there was no need for cylinder-head packings.

Ignition was by the electric make-and-brake system. There was an insulated electrode in the combustion-chamber wall, with which contacted one arm of a bellcrank located within the combustion chamber, the contact being broken when a pin screwed into the head of the piston struck the short arm of the bellcrank, toward the end of the out-stroke. Current was supplied by a primary battery, and the circuit included a so-called choke coil.

Cylinder lubrication was by a large oil reservoir on top of each cylinder. Each reservoir was divided into an upper and a lower compartment, separated by a heavy wall in which there were a shut-off valve and a regulating or metering valve. As clearly shown in the plan view of the engine, each shut-off valve was provided with an arm, and the two arms were connected to the knob which operated the ignition switch, so that the flow of oil was automatically shut off whenever the ignition current was turned off. After passing through the shut-off valve the oil had to flow through the metering valve, and the rate of flow could be adjusted by turning this valve one way or the other, by means of a

(*Turn to page* 98, *please*)

POWERFUL STIMULANT

"PERFECT" Oil Seals

PATENTED

With eleven years' previous experience, it was logical for Chicago Rowhide engineers to tackle the oil sealing problems for military vehicles when war came.

Chicago Rawhide seals were used on the tank with which we entered the war, and did a good job.

When the successor of this tank was designed for greater speed, the oil seals were improved to meet the more drastic speed requirements.

Later on, the entire track suspension was revised for greater effectiveness, and again Chicago Rawhide engineers improved oil seal design to meet requirements.

Practically all our military vehicles today are equipped with oil seals of Chicago Rawhide design.

This wartime experience will materially aid in giving you better seals for your postwar products than you ever had before Pearl Harbor.

CHICAGO RAWHIDE MANUFACTURING CO.

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66 years manufacturing quality mechanical leather goods exclusively and now Sirvene Synthetic Products

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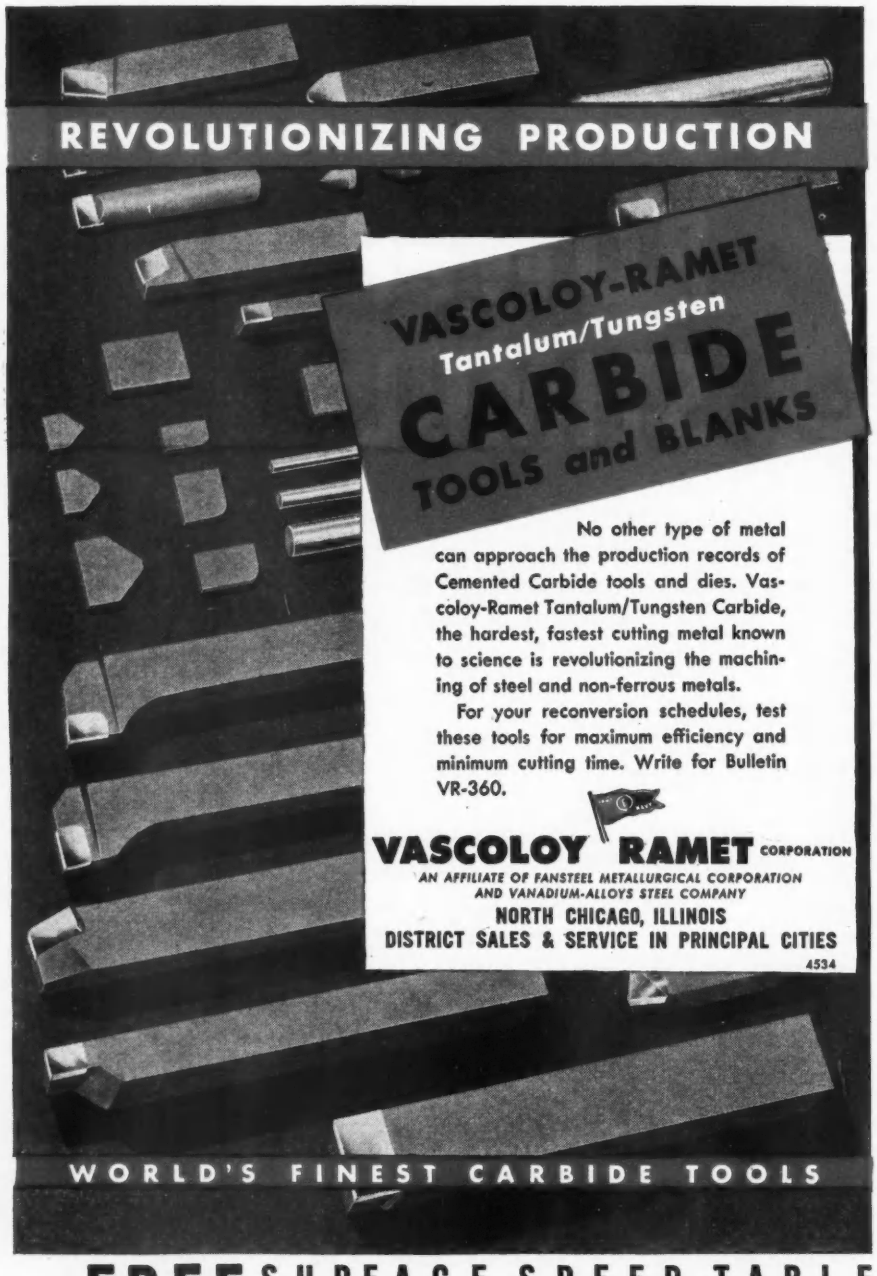
screw driver. The upper compartment of the reservoir was vented to the crankcase at the end of every outstroke of the piston.

Lubrication of the crankpins and piston pins was provided for by making the connecting rods of tubular form, as shown in the cross section of the engine, and using them as oil reservoirs. Centrifugal and inertia forces tended to cause the oil to flow to the bearings, through passages filled with compressible, fibrous material, and metering holes directly at the bearings.

Engine cooling was a problem that put the pioneer automobile builders entirely on their own, since practices in stationary and marine work furnished no clues to its solution. In stationary installations of gas engines, either tap water was allowed to run constantly through the water jackets at a slow rate, or the cooling water was allowed to circulate automatically through a large tank with adequate radiating capacity, and in marine work there was, of course, always plenty of cold water available for cooling purposes. The modern automobile radiator had not yet been invented, or at least was not in production here. On the Duryea, as well as on most other early gasoline cars, the cooling water was circulated through a relatively flat tank. This, of course, did not provide sufficient cooling capacity for continuous operation, and water had to be added periodically, or the hot water had to be replaced by cold. According to the umpire's report, the Duryea wagon consumed 3.5 gal of gasoline and 19 gal of water during the race. In the match race on November 2 the Mueller car carried a supply of ice on board for engine-cooling purposes.

This account of the first public demonstration of motor vehicles in this country would not be complete without some reference to the Pennington vehicles, which were entered by Thomas Kane & Co. of Chicago and Racine, Wis. They were equipped with the Pennington engine, which was claimed to operate on a revolutionary principle. Both the Duryea and Benz engines operated on the conventional four-stroke or Otto cycle, which had been used in gas-engine practice for about two decades. The Pennington also operated on a four-stroke cycle, but its cycle of operation differed from that of the others in that two successive sparks were produced in each cylinder, instead of a single one. The first of these sparks are claimed to "ripen" or "mellow" the mixture, without igniting it, and ignition was said to be effected by the second spark. A mixture thus "ripened" was claimed to produce greater power and less waste heat, so that it was unnecessary to provide the cylinder with a water jacket. As a matter of fact, the cylinders of Pennington engines consisted of short lengths of plain steel tubing. A bicycle engine had a bore of 2½ in. and a stroke of 13 in., and its connecting rod acted directly on a crank formed on the axle of the rear wheel.

To any one familiar with the properties of gasoline-air mixtures the claim that a spark could be produced in such a mixture without igniting it was, of course, preposterous. However, the engine lent itself to a demonstration that greatly impressed the uninitiated, for when the "ripening spark" was cut off, the power at once dropped to about one-half its former value, and the engine heated up more rapidly. Those familiar with explosion engines know, of course, that if the mixture is ignited only when the piston has completed a considerable fraction of the power stroke, it will develop less power and heat up more than when ignition occurs at the beginning of the stroke or slightly earlier. Pennington therefore was careful not to entrust his vehicles to others, and none of them was submitted for the official tests. The engineers might have cut out the second spark and found that the first ignited the charge. Pennington vehicles were present at the start of the preliminary race, but they were there "for exhibition purposes only."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There is no attribute of carburetor performance in which Holley Carburetors do not excel. Millions of miles have proved their outstanding dependability. Holley's 50 years of experience . . . its research, design and precision manufacturing . . . have contributed greatly to engine efficiency, economy and dependability of performance. Out of this pool of engineering skill and production facilities have come many major carburetor improvements. Because of these achievements . . . the real test of leadership . . . engineers and owners alike are assured better, smoother engine performance and greater carburetor efficiency. Look to Holley for continued carburetor leadership!

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CARBURETORS AND ACCESSORIES

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for automotive foundry
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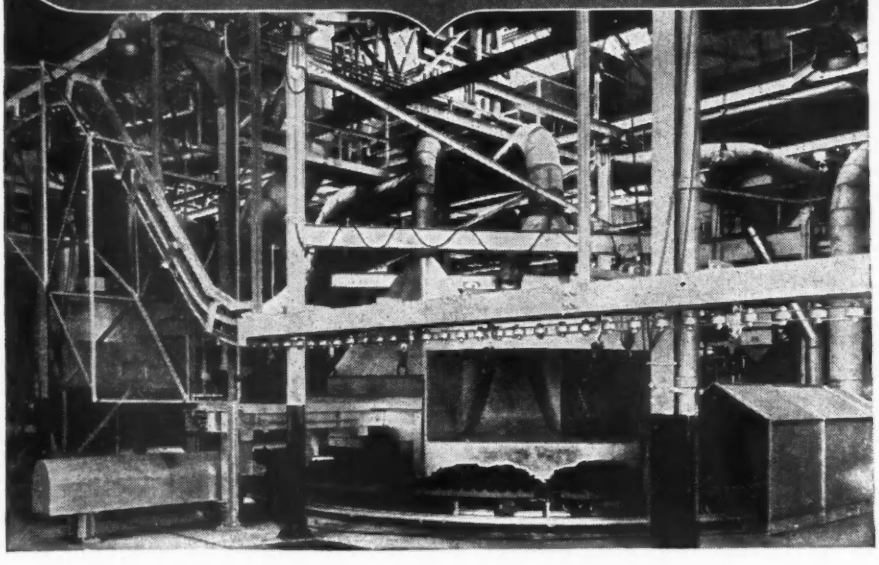
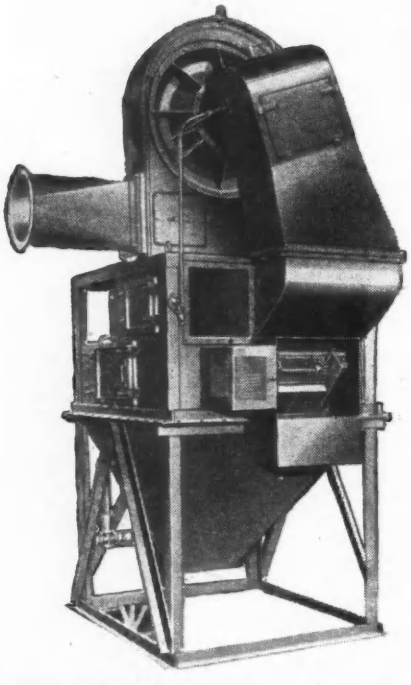


In heavy duty shakeout service Roto-Clone has proved its value through years of successful performance. The Type W Roto-Clone, which can be seen in the background at the left of the picture above, exhausts the cope and drag shakeout and the casting removal station. This Roto-Clone dust control installation is typical of many such systems serving leading foundries throughout the country. For information on the Type W Roto-Clone (wet type) for foundry service, ask for Bulletin No. 274 A.



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MANUFACTURER'S ASSOCIATION INC. FOUNDRY EQUIPMENT

AAF TYPE W ROTO-CLONE

Publications

(*Continued from page* 46)

tions and illustrations of plastic molding presses, electronic molding presses, etc., are included.*

How to Increase Production, Improve Accuracy, Eliminate Manual Indexing with a Sundstrand Automatic Index Base, is the title of a new bulletin by Sundstrand Machine Tool Co. It contains illustrations, description of specific applications, features and engineering data on the Automatic Index Base.*

A new bulletin describing **Post Forming Dilecto** has been issued by Continental-Diamond Fibre Company. In addition to heating and time/thickness curves, the bulletin contains information on the uses of Post Forming Dilecto, C-D design and engineering service, forming procedure and physical properties.*

Norton Company has published a new circular on **Norbide** for dies, gages, anvils, nozzles and abrasives. The circular is illustrated in color, gives information regarding the Norbide process and a page of tables giving the physical facts about Norbide (Norton Boron Carbide).*

The B. F. Goodrich Co. has published an attrictive and well-illustrated 38-page booklet on industrial tires titled **How to Save Money on Industrial Hauling Jobs and Equipment.** The booklet contains a discussion of how rubber industrial tires give 6-way savings to users, less hauling time, floor wear, etc., followed with a description of scientific tests proving that rubber tires possess these advantages. A section on care and maintenance of industrial tires is included. Among subjects discussed are centering tires correctly on wheels, selecting proper tire, etc. Description, and photographs of the B. F. Goodrich industrial line are given with data on each tire.*

Victor Saw Works, Inc., has issued a revised edition of the handbook, **Metal Cutting,** an illustrated handbook giving information on selection, care and use of hand and power hack saw blades.*

Simmonds Aerocessories, Inc. has published a bulletin on the **Simmonds Pacitor Gage.** Included is a general description of the gage, fuel chart, design details of the gage components, tank units chart, parts list and installation information.*

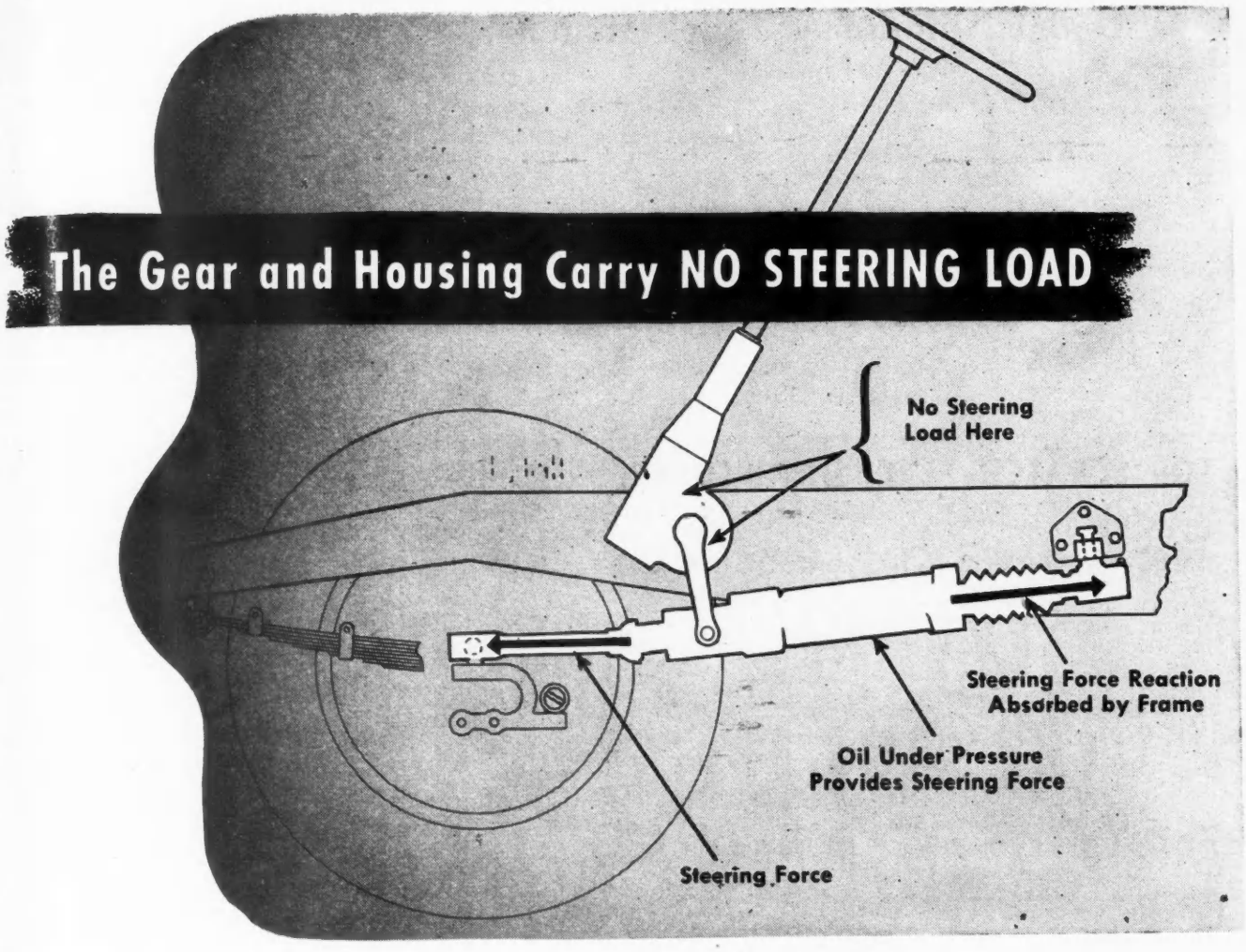
McAleer Mfg. Co., Industrial Finishing Div., has issued a new, illustrated, 24-page industrial finishing reference manual on **Polishing, Buffing and Deburring.** The booklet tells when and where to use what compositions, summarizes and interprets applications, offers helpful suggestions for present-day finishing of all types of metals, non-metals and plastics.*

Rockford Magnetic Products Co. has issued a new booklet on its **Power-Grip** line of magnetic chucks. Space is devoted to the history, principle of Power Grip, applications, advantages, operating instructions, etc. Sketches showing Power Grip holding methods, operating instructions and specifications for standard chucks, descriptions and illustrations of magnetic rotating chucks, etc., are included.*

Aeroquip Corp. has published Industrial Bulletin No. 104 on **Medium Presssure Hose Assemblies.** Included are descriptions and illustrations of various hose assemblies, a table of dimensions of fittings and adapters and a table of dimensions of Type 1501 hose.*

A new bulletin describing **Phos-Trode,** a shielded arc, phosphor bronze welding electrode, has been issued by Ampco Metal, Inc. The bulletin is illustrated with typical welds and tests, contains weld deposit physical properties, recommended amperage, welding procedure and a list of typical applications*

* Obtainable by subscribers within the United States through Editorial Dept., AUTOMOTIVE *and* AVIATION INDUSTRIES. In making requests for any of these publications, be sure to give date of the issue in which the announcement appeared, your name and address, company connection and title.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No Steering Load Here
Steering Force Reaction Absorbed by Frame
Oil Under Pressure Provides Steering Force
Steering Force

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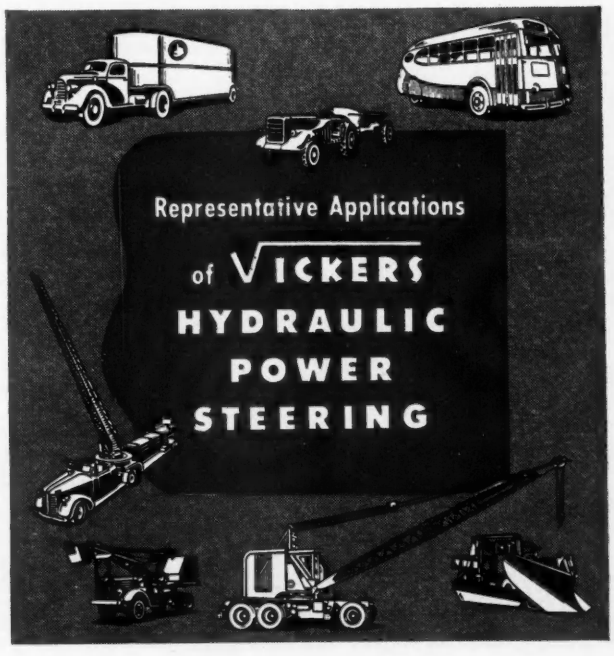
Neither steering load nor road shock can reach the steering gear and housing when Vickers Hydraulic Power Steering is used. All the steering load is carried by the hydraulic cylinder, and road shocks are transmitted to the frame. The Vickers booster unit is controlled by the pitman arm and actuates the drag link directly. Direct application of power assures protection against wear or failure in the steering gear proper—makes it possible to use a lighter, more economical gear and housing with complete safety.

There are many other advantages of effortless Vickers Hydraulic Power Steering. Ask for Bulletin 44-30 which contains complete information.



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Dodge Announces Truck Models

(*Continued from page* 38)

resist entry of water and dirt.

The model WC is the ½-ton on 116 in. wheelbase and is offered in a chassis with flat face cowl, chassis with windshield cowl, chassis and cab, and pickup and panel bodies. Standard tire equipment is 6.00-16 4-ply, front and rear, with optional sizes offered at extra cost. The standard rear axle ratio is 4.1 to 1, with options of 3.7 and 4.7 to 1. Double-acting, airplane type shock absorbers are standard front and rear. This model has a gross vehicle weight rating of 4200 lb. The engine is L-head, six-cyl., 3¼ in. bore by 4⅜ in. stroke, 217.8 cu in. displacement, rated 95 hp at 3600 rpm. Maximum torque is 172 lb-ft at 1200-1900 rpm. Among the new mechanical features are the following:

1. Propeller shafts of improved design with needle bearing universal joints.

2. A new type steering gear of heavier construction. Its ratio is 18.2 to 1.

3. Crankcase oil lever indicator is more accessible, and fitted with an improved seal to exclude dirt.

4. The rear axle now incorporates a four-pinion differential. Axle shafts are of larger diameter.

5. Braking area has been increased by the use of 11 x 2 rear brakes instead of the former 10 x 2.

The Model WD, 1-ton line is offered in 120 in. and 133 in. wheelbases and is available in chassis with flat face cowl, chassis with windshield cowl, chassis with cab; and in express, platform, and stake bodies. Standard tire equipment is 6.50-16 6-ply front on 4.50 rims, and 7.00-16 6-ply rear on 5.50 rims. Optional tire sizes are offered at extra cost, including dual rears in certain sizes. Standard rear axle ratio is 4.3 to 1; optional ratios—3.9 and 4.89 to 1. Double-acting, airplane type shock absorbers are standard equipment at the front only.

The model WD Series has a rating of 6400 lb GVW. The engine is L-head, 6-cyl., 3¼ in bore by 4⅝ in stroke, 230.2 cu in. displacement, rated 105 hp at 3600 rpm. Maximum torque is 184 lb-ft at 1300-2000 rpm. The following outlines new mechanical features:

1. More accessible location of the crankcase oil lever indicator with improved seal to exclude dirt.

2. Number of flywheel bolts increased from 4 to 8 for added strength and trouble-free service.

3. A new type, heavy-duty steering gear, with 18.2 to 1 ratio.

4. New heavy-duty rear axle with four-pinion differential replacing the former two-pinion type. A still larger four-pinion differential axle with three bearing mounting for the drive pinion is available at extra cost for extremely heavy-duty service. Larger diameter axle shafts further increase life.

The 1½ ton series comprises the following group of models:

Model WF and WFA (dual-purpose) on 135 5/16 in. wheelbase; also the 1-ton Special: available as chassis with flat face cowl, chassis with windshield cowl, chassis and cab; also in express, platform and stake bodies.

Model WF and WFA; also the 1-ton Special, in 160 in. wheelbase: available as chassis with flat face cowl, chassis with windshield cowl, chassis and cab; also in platform and stake bodies.

Model WF and WFA on 190 in. wheelbase, available as chassis with flat face cowl, chassis with windshield cowl, chassis and cab.

Model WFM and WFMA covers the 1½ ton cab-over-engine line offered in a range of 105, 129, and 159 in. wheelbases. The 105 and 129 in. wheelbase models come in chassis and cab, and platform and stake bodies, while the 159 in. job comes only as chassis and cab.

The 1½ ton Series has two GVW ratings, depending upon equipment.

(*Turn to page* 104, *please*)

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For Your Buffing Needs!

PRODUCING a brilliant, undistorted finish on nickel, brass, copper and softer metal surfaces demands that extreme care be used in selecting the "right" composition to do the work. Ease of cleaning, a most desirable and vital factor, must also be kept in mind if production costs are to be held to a minimum.

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FIND OUT before ASSEMBLY whether gears are NOISY.

Gears must be quiet in operation . . . and the time to find out whether they are quiet or not is before they have been assembled. Testing gears before they have been assembled eliminates the necessity of tearing down and rebuilding.

The Red Ring Gear Sound Tester gives you this information quickly and if the gears tested are noisy, it gives you the information necessary to correct the trouble.

One of this machine's principal characteristics is a sound chamber and acoustical horn which amplifies gear noises 50 times. Gears up to 18" O.D. may be run under brake load and center distance setting may be made to precision gage block accuracy.

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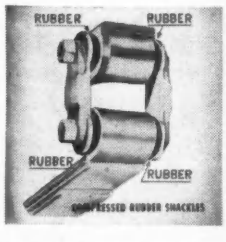
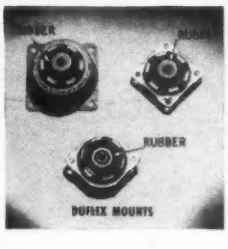
If yours is a problem involving vibration and noise drop us a line; our engineers will be glad to work with your engineers in its solution.





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Standard rating is 13,500 lb GVW on all models with standard equipment. However, a 14,000 lb GVW rating is made on vehicles equipped with heavy-duty two-speed axle and other items specified by the factory. The engine is L-head, six-cyl., 3 7/16 in. bore by 4¼ in. stroke, 236.6 cu in. displacement, rated 115 hp at 3800 rpm, with maximum torque of 190 lb-ft at 1500-2200 rpm. Standard tire equipment consists of 6.00-20 6-ply front and 6-50/20-32, 8-ply dual-marked, single rear tires, mounted on ventilated disk wheels. A wide variety of tire sizes in several ranges of plies, as well as dual tires, are available as optional equipment. Standard rear axle ratio is 6.285 to 1. Optional ratios are 5.1 to 1, 5.625 to 1, and 6.838 to 1.

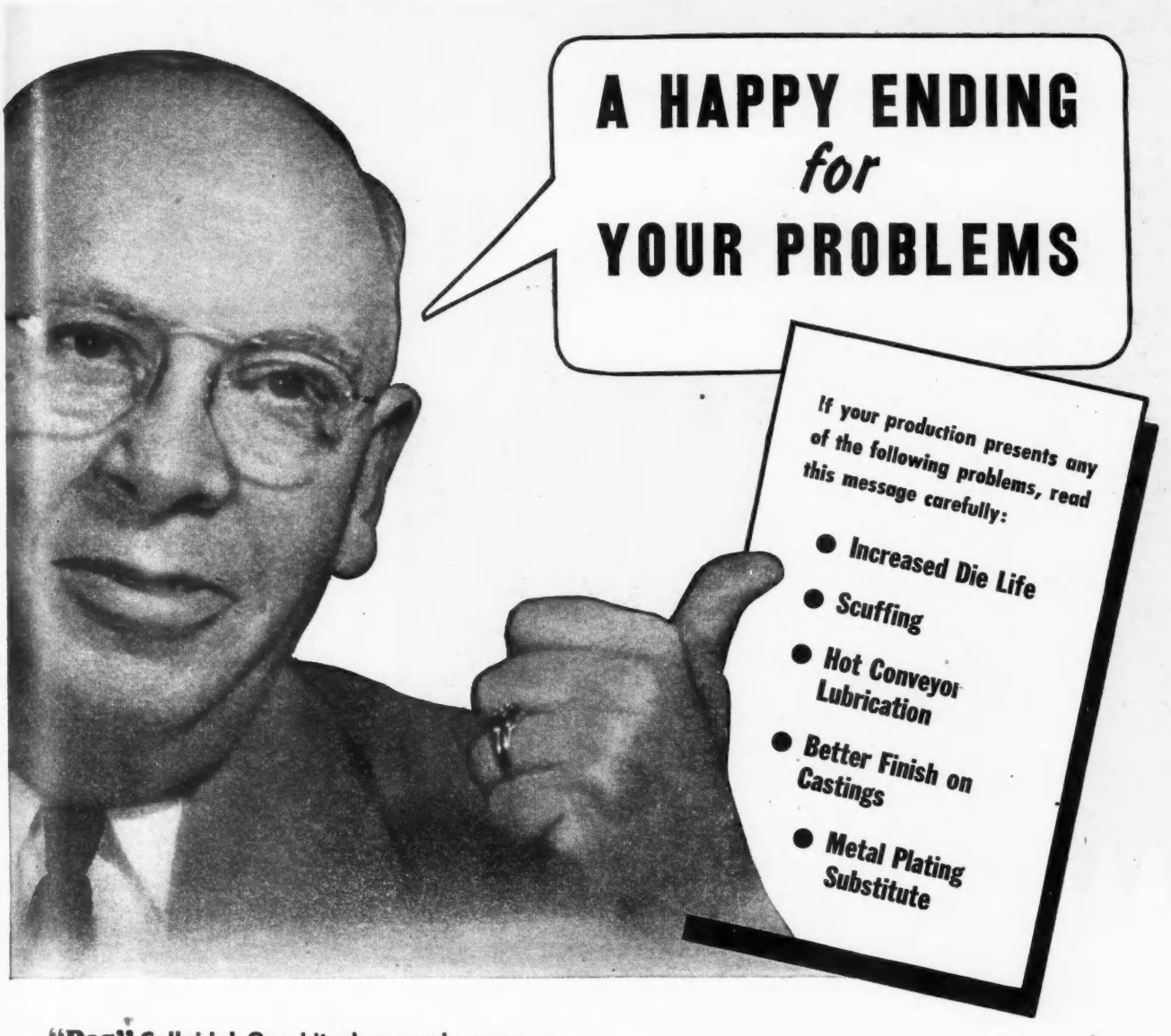
Dual purpose models are supplied with two-speed Eaton axles with fingertip control vacuum shifting mounted conveniently on the gearshift lever. The standard ratio on 1½ ton models is 5.83-8.11 to 1; optional ratio is 5.14-7.15 to 1. The companion WF Series 1-ton Special models are identical, mechanically, with the corresponding 1½ ton models to meet the needs of operators whose operating conditions are such as to require greater ability than is normally available in the 1-ton series but where loads do not warrant a 1½ ton rating.

The following are some of the new mechanical features on 1½ ton models:

1. Flywheel bolts increased from 4 to 8.
2. Water pump fitted with an improved rubber seal.
3. Propeller shaft universal joints are heavier, increasing capacity by 30 per cent.
4. New heavy-duty steering gear with an increase in ratio from 17 to 1 to 23.2 to 1.
5. Changes in the rear axle differential loading to greater capacity and longer life. Rear axle shafts increased in diameter.
6. Dual purpose, two-speed axles fitted with vacuum shift instead of manual shift, simplifying and cleaning up connections and offering quicker selection of shifts. In addition, the speedometer gear hook-up is arranged for an automatic shift to accommodate changes in rear axle ratio so as to maintain an accurate record of speed and mileage.
7. As optional equipment, Dodge offers the Midland 9½ in. Vacuum Hy-Power booster brake. It is better located than the former 6-in. booster; not subject to damage, can be readily relocated in the event of special installations, and eliminates troublesome mechanical linkage.
8. Front springs are 2 in. wide with double-wrap leaves.

The 2-ton line consists of the Model WH and WHA (dual purpose) vehicles, with corresponding models of the 1½ ton Specials in conventional mod-

(*Turn to page* 106, *please*)



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els; and the WHM and WHMA (dual purpose) vehicles, with corresponding models of the 1½ ton Specials in Cab-Over-Engine jobs. Conventional models are offered in a range of wheelbases—136, 148, 160, 178, and 220 in. The COE models are available in 105 and 159 in. wheelbases.

Body styles are as follows: Conventional, 136 and 160 in. wheelbase—chassis with flat face cowl, chassis with windshield cowl, chassis and cab; and platform and stake bodies. Conventional 148, 178, and 220 in. wheelbase—chassis with flat face cowl, chassis with windshield cowl, and chassis and cab. On COE models: 105 in. wheelbase—chassis and cab, and platform and stake bodies; on 159 in. wheelbase, chassis and cab only.

The 2-ton line has a standard GVW rating of 15,000 lb with standard axle or the small dual-purpose axle. A special rating of 16,000 lb GVW (max.) is offered when special equipment, specified by the factory, is supplied. The engine is L-head, six-cyl., 3 7/16 in. bore by 4½ in. stroke, 250.6 cu in. displacement, rated 120 hp at 3800 rpm. Maximum torque is 200 lb-ft at 1500-2100 rpm. Standard tire equipment consists of 6.50-20 6-ply front and dual rear with 5-in. rims all around on the 2-ton models. The 1½ ton Specials in this series are fitted with 6.00-20 6-ply front and dual rear with 5-in. rims all around. A wide range of tire options is offered as special equipment. Standard rear axle ratio on all single reduction models is 6.285 to 1; optional ratios are 5.11 to 1, 5.625 to 1, and a 7.166-7.35 to 1 double-reduction axle. On the dual-purpose models, the Eaton double-reduction axle of 5.83-8.11 to 1 ratio is supplied as standard. Optional ratios are 5.14-7.15 to 1, and 6.1-8.5 to 1.

The 1½ ton models, companion to the 2-ton Series, are identical mechanically with the 2-ton models and are designed for users whose operating conditions require greater ability than is available in the regular 1½ ton models, but where loads do not warrant a 2-ton truck rating. The following is a listing of some of the new mechanical features available on the 2-ton line:

1. Number of flywheel bolts increased from 4 to 8.
2. Improved rubber seal for the water pump.
3. Five-speed transmission redesigned to provide dual power take-off outlets, one on each side.
4. Propeller shaft universal joints made heavier with about 40 per cent increased capacity.
5. Heavy-duty steering gear with 23.2 to 1 ratio replacing 17 to 1 ratio.
6. Vacuum control of dual purpose axle shifting.
7. Midland Vacuum Hy-Power 9½ in. booster brake as standard equipment on all 2-ton models.
8. Two-in. wide double-wrap front leaf springs standard on all models.

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Nut turning operations, straight through the plant, frequently offer unsuspected opportunities to cut costs, improve precision and promote safety. Ordinary wrench equipment does not measure up to modern production requirements. For every nut-turning job there is an *engineered* Snap-on wrench unit that will handle the operation faster and easier, with utmost accuracy and safety. Check the savings, job by job, that can be made with this modern, *engineered* wrench equipment. Write today for the Snap-on catalog. SNAP-ON TOOLS CORPORATION, 8054-K 28th Avenue, Kenosha, Wis.

NEW PRODUCTS

(*Continued from page* 80)

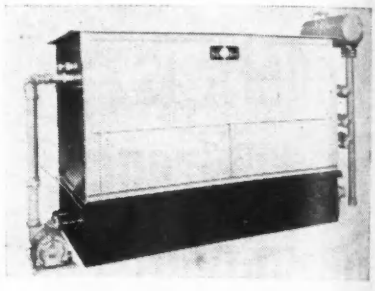
phosphor crystals which produce the regular daylight and white light, the new color is about midway in color quality and also light output between the present standard white fluorescent lamp and the daylight lamp. The standard white and daylight lamps will still be available.

The new color will be offered in only the 40 and 100-watt sizes, the two most popular fluorescent lamps for industrial and commercial applications. The color designation "4500 degree white" refers to its color temperature measurement on the Kelvin scale.

Improved Line of Liquid Coolers

Niagara Blower Co., New York, N. Y., presents an improved line of industrial liquid coolers which furnish refrigerated cooling water or any aqueous solution for industrial uses, especially the cooling of water to the lowest possible temperature above freezing for air conditioning or water cooling jackets—or in chemical, photographic and industrial processes.

The method used is to spray the cooling water over banks of coils in which the refrigerant is expanded. The water falls into a tank and is recirculated independently of the distributing system, thereby gaining the closest control over temperatures and efficiency in heat transfer regardless of intermittent cooling operations or variations from maximum to minimum cooling load. It is possible to produce 33-deg. water constantly without danger of damage from freezing—as the system is open and does not depend for safety on the proper functioning of the back pressure regulating valve. To provide temperatures below freezing, the coolers may be operated with Niagara "No Frost" liquid solution.



Niagara industrial liquid cooler

The range of capacities in different sizes runs from 4.7 to 137 tons refrigeration. The model rated at 137 tons is 105 in. long by 88 in. high by 60 in. wide. Water deliveries range from 11 to 220 gpm.

Chemically Stable Deep Drawing Compound

A drawing compound that maintains its inherent physical properties in the deep drawing of ferrous and non-ferrous alloys, has been placed on the market by the Northwest Chemical Co., Detroit, Mich., and is known to the trade as Superdraw. It has a high film strength and does not separate even under intense stresses. The electrical properties of the molecules at the interface, between the lubricant and the metal surfaces, are said to remain constant during the drawing operation because of the chemical stability of this compound.

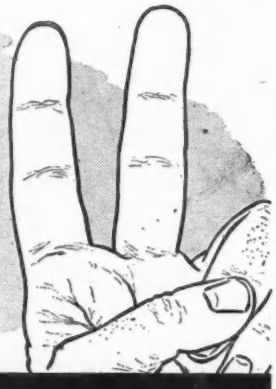
Industrial Apron

A light duty industrial apron to give maximum protection against oil, which is also acid, caustic and waterproof has been added to the line of the B. F. Goodrich Co. It is double coated by the calender method with Ameripol, the company's exclusive type of synthetic rubber.

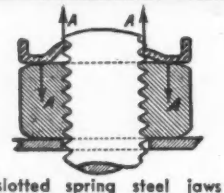
Made in two sizes, 29 by 35 in. and 34 by 45 in., it is constructed with hem-

(*Turn to page* 110, *please*)

NOT ONE—BUT
TWO LOCKING ACTIONS WITH PALNUTS!

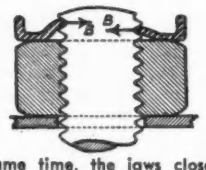


1. HOLDS THE NUT



Arched, slotted spring steel jaws exert powerful tension upward on the bolt thread and downward on the regular nut.

2. GRIPS THE BOLT



At the same time, the jaws close in and grip the root of the bolt thread all around, like the jaws of a chuck.

Hold tight under severest vibration

With a regular nut carrying the load, and a PALNUT to keep it tight—you have a powerful fastening team that licks vibration, stress, heat and oil. Made of spring tempered steel, PALNUTS provide absolute security wherever bolted assemblies *must* stay tight . . . on structural members or engine parts.

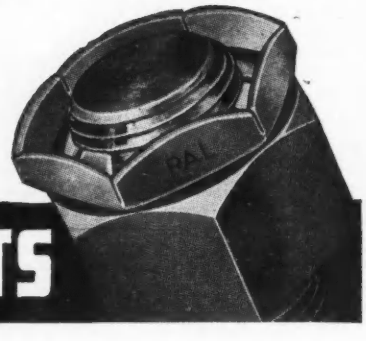
Double-locking PALNUTS offer advantages over various types of locking devices . . . in security, in cost or in ease of assembly. PALNUTS are extremely low in cost, light in weight, require only 3 bolt threads space, apply speedily with hand or power drivers. May be re-used. Proved for over 15 years on every type of machinery and equipment.

WRITE for Palnut Manual No. 1 which gives complete data. Send details of assembly for samples.

TYPICAL AUTOMOTIVE USES:

Connecting Rods . Main Bearings . Engine Mounting . Radiator Mounting . Body Hold Down . Shock Absorber Mounting . Sway Bar Mounting . Hand Brake Applications . Body Hardware and Accessories

THE PALNUT CO., 60 Cordier St., Irvington 11, N. J.



DOUBLE-LOCKING PALNUTS

What new "armor" for steel can save America millions each year?

YEAR AFTER YEAR—in war or peace—America pays a colossal toll in dollars to a foe as unrelenting as any ever known.

It is the enemy *rust*, that attacks and destroys things made of steel. But now a remarkable new discovery can bring you steel products that will *defy* rust up to 4 times longer . . . Hardware, screens, fencing, automobiles, tractors, dozens of important items that will outlast any you've ever owned by as much as 4 to 1!

This remarkable discovery is CORRONIZING, the patented alloy "armor" that gives steel a new lease on life. Yes, CORRONIZING is new . . . but also thoroughly tested and proved. For CORRONIZING has demonstrated its overwhelming superiority in the war, under the worst possible conditions on land, at sea and in the air.

By test and performance, CORRONIZING FAR OUTLASTS OTHER PROTECTIVE COATINGS FOR STEEL. Now, the more progressive factories and retailers will be able to bring you products made of "Corronized" steel. Motor car makers—always leaders—will be among the first to offer you this sensational advantage.

Remember that name—CORRONIZING. It can save you and millions of other Americans a huge tax bill now needlessly paid to the enemy rust.

Standard Steel Spring Co.

ORIGINATORS OF

CORRONIZING

The Magic Carpet to Longer Life for Steel

CORRONIZED
For Enduring Protection
Against Rust

Quick Facts for Manufacturing and Sales Executives

Do not confuse CORRONIZING with other metal coatings. This patented process provides a permanent alloy "armor" with 5 layers of defense against corrosion! It becomes part of the steel base . . . can be worked in any manner. Permits using lighter materials by prolonging steel's period of greatest strength. Write for samples and complete information.

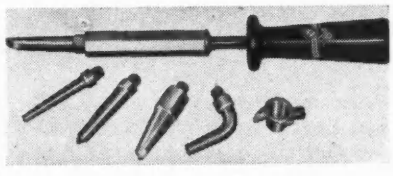
STANDARD STEEL SPRING COMPANY
CORAOPOLIS, PENNSYLVANIA

med edges and attached neck and waist tapes. It is suitable for use on light assembly and bench work in machine shops, chemical plants, laboratories and other applications where a lightweight garment is needed to protect a worker from acid, oil, caustic or water.

The garment is also impervious to gasoline and benzole. It is said to be unaffected by 24 hours complete immersion in 50 per cent concentrations of sulphuric, nitric and hydrochloric acids, and 25 per cent solution of caustic soda.

Electric Soldering Iron with Built-In Heat Control

An electric soldering iron with built-in thermostatic heat control is now being delivered by Sound Equipment Corp., Glendale, Cal. This soldering iron is called "Kwikheat" because it heats up, ready-to-use only 90 seconds after plugging in. This is made possible by a special 225 watt quick-heating element—held in check by the thermostat.



Kwikheat soldering iron and interchangeable tips

The Kwikheat iron has a hard-chrome plated steel octagonal shell, a plastic handle, and weighs only 14 oz.

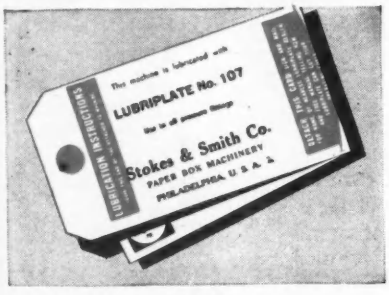
Six different tip styles can be interchanged on any Kwikheat iron. The tips are made of corrosion-resistant copper alloy. They screw into the iron for good contact and are tapered for efficient heat conductivity. One tip is an aluminum alloy melting pot for tinning, etc.

New Ceramic Has High Dimensional Stability

A thermal expansion coefficient in the same range as that of Invar, and high resistance to extreme thermal shock are among the properties of a ceramic material recently revealed by General Ceramics and Steatite Corp., Keasbey, N. J. The manufacturer advances as potential uses for the new ceramic such applications as in high-temperature furnaces, insulation for high precision instruments in which dimensional changes must be absolutely minimized, and for many electrical and electronic purposes demanding a low thermal expansion coefficient in high quality ceramic parts.

The company plans to supply Material M-244 in any shape that can be formed by pressing, extruding, or casting.

LUBRICATION SERVICE FOR MACHINERY MANUFACTURERS



The machinery manufacturer can use LUBRIPLATE for initial lubrication . . . but once a machine is shipped, the lubrication is up to the user. To assure continued lubrication with LUBRIPLATE, we offer the TAG PLAN to machinery manufacturers.

1. Points to be lubricated and types of LUBRIPLATE to be used are imprinted on the tag.
2. The name of the machine manufacturer on the tag gives authority to the recommendation.
3. A return postcard is part of each tag. The machine buyer signs the tag and mails it to us.
4. We notify the nearest LUBRIPLATE Dealer. We send the name of the dealer to the machine user.

LUBRIPLATE

Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

LUBRIPLATE

Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

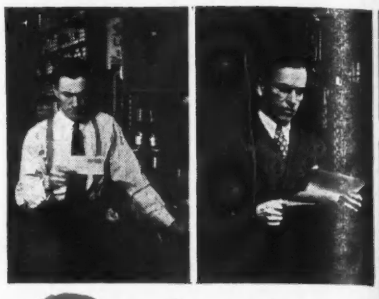
LUBRIPLATE

Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.

Write for a booklet, "The LUBRIPLATE Film"

LUBRIPLATE
FISKE BROTHERS REFINING CO.
NEWARK 5, N. J.
TOLEDO 5, OHIO
OUR 75TH YEAR
1870 - 1945
DEALERS FROM COAST TO COAST

LUBRICATION SERVICE FOR MACHINERY USERS



The manufacturer of machinery using LUBRIPLATE for initial lubrication wants the machine operator to continue to use it for service lubrication. LUBRIPLATE is the best lubricant for the job. That is why it was used in the first place. To assure you of a convenient source of supply of LUBRIPLATE, the machine manufacturer put a tag with a postcard on the machine before he shipped it. Tear off the postcard, fill in your name and address and mail it to us. We will notify you of the name and address of the nearest LUBRIPLATE Dealer and see that he calls on you.

℞ FOR YOUR MACHINERY

No. 3—Ideal for general oil type lubrication. Ring oiled bearings, wick feeds, sight feeds and bottle oilers.

No. 8—Because of its high film strength and long life reflects outstanding performance in most types of enclosed gears (speed reducers).

No. 107—One of the most popular grease type products for general application by pressure gun or cups.

No. 70—For a wide range of grease applications, especially at temperatures above 200 degrees F

No. 130-AA—Known nationwide as the superior lubricant for open gears, heavy duty bearings, wire rope, etc.

BALL BEARING—This is the LUBRIPLATE lubricant that has achieved wide acclaim for use in the general run of ball and roller bearings operating at speeds to 5000 RPM and temperatures up to 300 degrees F.

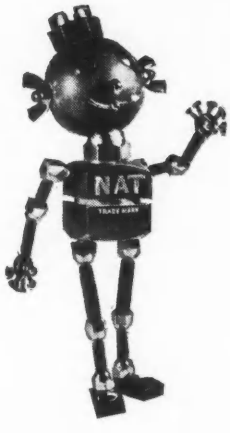
Write for a booklet, "The LUBRIPLATE Film written especially for your industry.

LUBRIPLATE
FISKE BROTHERS REFINING CO.
NEWARK 5, N. J.
TOLEDO 5, OHIO
OUR 75TH YEAR
1870 - 1945
DEALERS FROM COAST TO COAST

INSTRUMENT SCREWS

EACH ONE A

Picture of Precision



National
HEADED AND THREADED
PRODUCTS

Many civilian products will require precision-made screws of the same high quality that has been perfected for aircraft instruments.

Formerly, it was considered necessary to use Swiss watch-making machinery to produce this fine precision which "National", by its method of upsetting and finishing the head and rolling the thread, has produced all through the war.

From the tiniest screw to the largest sizes, accuracy and uniformity are maintained through "National's" methods of manufacture and thorough inspection. Furnished in many grades of ferrous and nonferrous metals, e.g., carbon steels, stainless steels, brass or bronze.

Let us have your inquiry.

THE NATIONAL SCREW & MFG. CO., CLEVELAND 4, O.

Desealing Without Electric Current

Culminating years of laboratory research and mill experience, the du Pont Co. announces a sodium hydride process for descaling metals — in a sense an alkaline pickling bath which requires no electric current.

The process is said to have many advantages over the usual acid pickling for alloy steels and particularly the stainless steels. These include a shorter time for descaling, elimination of the possibility of pitting the metal through careless practice, and saving of 2 to 3 per cent of the steel which may be lost through the action of acid.

The scale, reduced by the sodium hydride dissolved in fused caustic, virtually is blasted from the surface of the metal by the generation of steam in a subsequent water quench. Only a few seconds' dip in acid to brighten the surface remains to be done.

The sodium hydride bath is effective on such metals as nickel, cobalt, and copper as well as on alloy and stainless steels.

Nine advantages of the process have been tabulated from experience, the du Pont Co. said. They are: 1. The bath, containing active sodium hydride, penetrates throughout the work and uniformly descales all surfaces; 2. All grades of alloy steels can be descaled and different grades can be descaled interchangeably using the same procedure; 3. There is no loss of metal; usually 2 to 3 per cent is lost in other pickling processes; 4. No harm can result from too long treatment; the hydride bath will not pit the work; 5. Since the bath does not attack metal at its working temperature, an ordinary low carbon steel tank can be used; 6. No electric current is necessary; 7. The working temperature of 700 F. is sufficiently low that there is no deleterious effect on the structure of the metal; 8. The hydride bath does not produce hydrogen embrittlement of the steel; 9. Savings in time, space, and disposal of waste residue are important items.

Sodium hydride dissolves in molten caustic and the solution reduces iron oxide to metallic iron. The sodium hydride reacts with the scale to form caustic soda, which is the material comprising the bath itself. The reaction: $Fe_3O_4 + 4NaH \ldots\ldots 3Fe + 4NaOH$. Thus, no undesirable impurities are added to the bath and the metal walls of the tank are not attacked.

In the first large installation based on laboratory experience, the caustic tank was 4 ft. 10 in. by 15 ft. by 5 ft. Six generators to supply the caustic bath continuously with sodium hydride were mounted in the tank along one side. These generators are rectangular boxes open at the bottom and have a cover with feed holes provided with removable caps so that additional sodium bricks may be added. The bottoms of the generators are below the average bath depth. A gas inlet tube passes through the cover of each box and delivers hydrogen into the generator near the bottom.

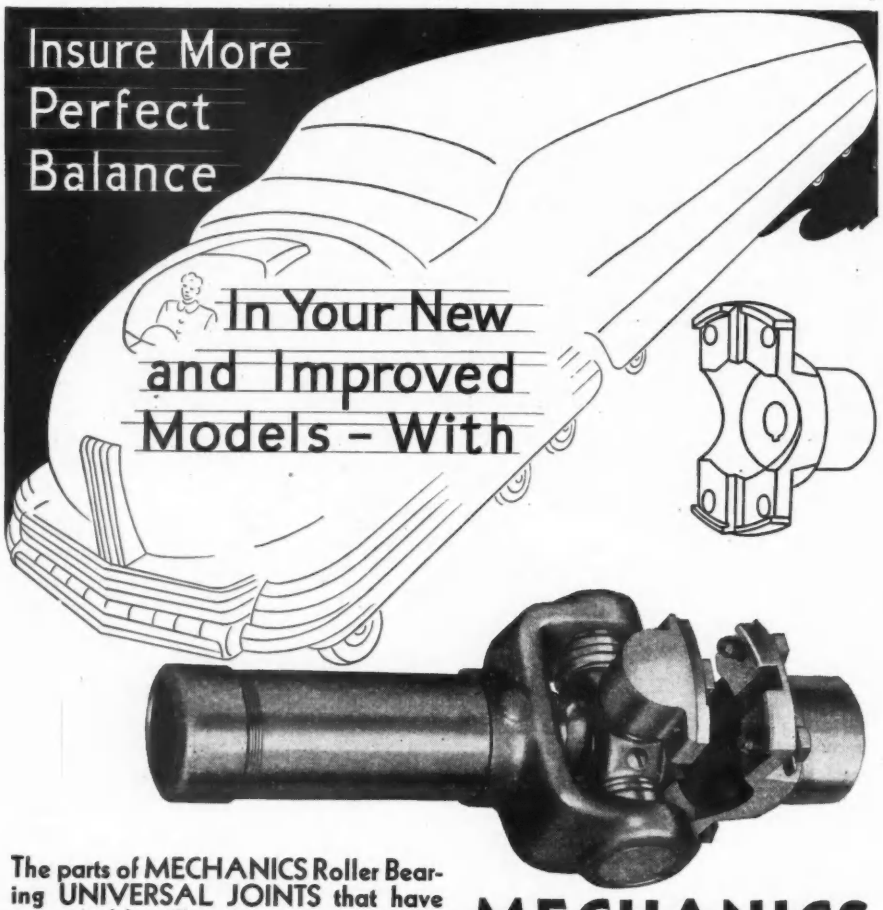
Hydrogen is obtained by dissociating ammonia in a standard dissociator. After dehydrating the bath, a concentration of 1.5 per cent sodium hydride is built into it.

A steel water tank located about six feet from the caustic tank is used for quenching the work. Exhausters in the wall above the water tank serve as ventilators.

The descaling unit, in the first installation, was in a corner of the pickle room and no additional equipment was required other than that used in the usual pickle house.

Hot rolled rod is suspended on a horizontal rack and submerged in the fused caustic bath for 15 minutes. On removing the work and quenching it in the water tank, most of the scale is removed. The remaining reduced material which gives a gray matte appearance to the surface is then quickly removed by a one- to two-minute dip in 10 per cent nitric acid after which the work is washed and dried in the usual manner.

(*Turn to page* 114, *please*)



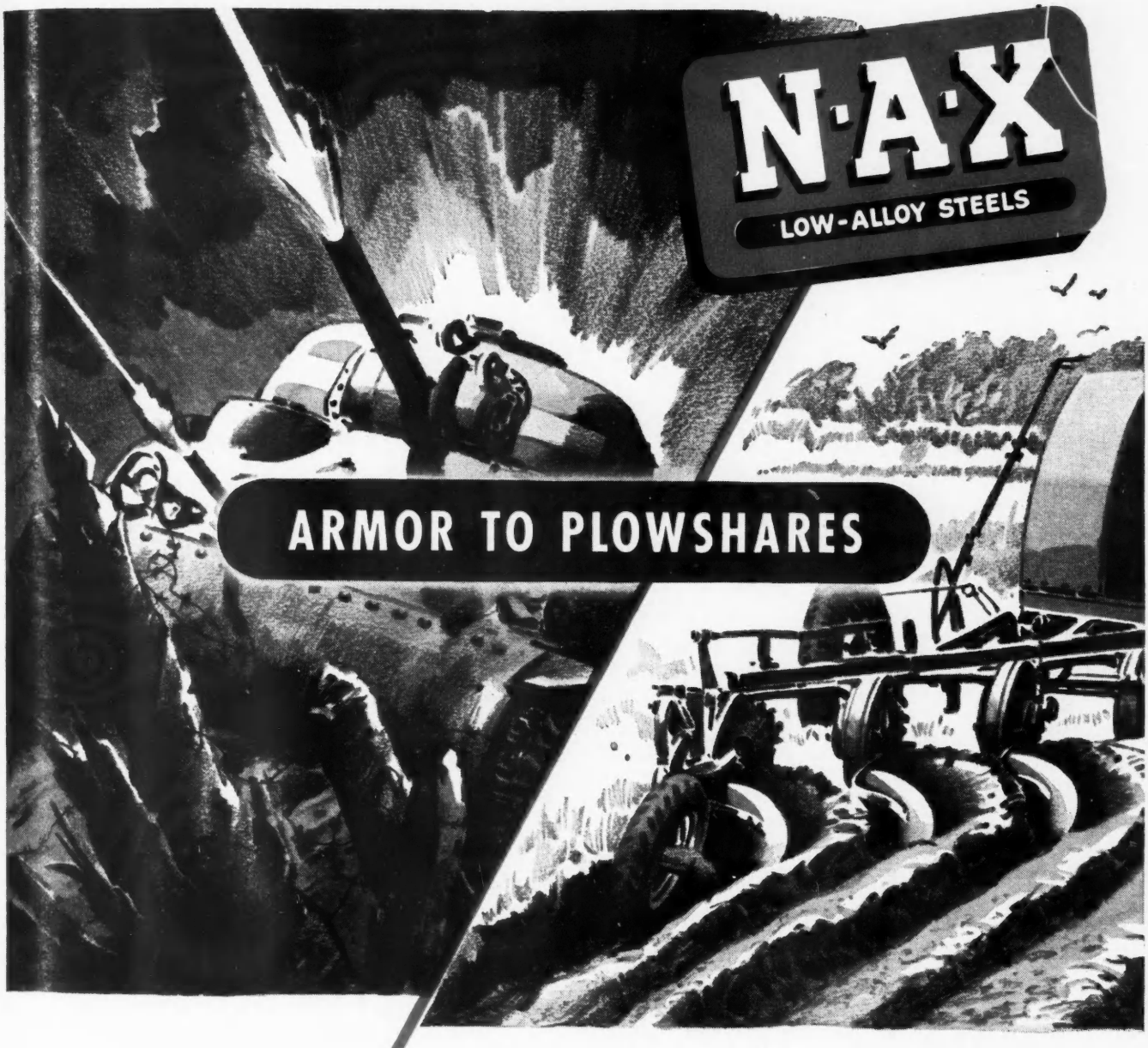
The parts of MECHANICS Roller Bearing UNIVERSAL JOINTS that have appreciable effect on smooth running balance are machined all over. Forging irregularities which might cause an out-of-balance condition are removed. Let our engineers show you how this operation - smoothing feature, and several other MECHANICS advantages, will benefit your new and improved models.

MECHANICS *Roller Bearing* UNIVERSAL JOINTS

Mechanics Universal Joint Division
BORG-WARNER CORPORATION 2020 Harrison Avenue Rockford, Illinois
Detroit Office — 7 — 234 G. M. Bldg.

MECHANICS *Roller Bearing* UNIVERSAL JOINTS ARE SERVING IN •

CARS & TRUCKS • AMPHIBIANS • SHIPS & AUXILIARIES • AIRPLANES • AND TANKS



It has already happened. . . . One of the fine-grained N-A-X low-alloy steels — steels that have provided armor for tanks and landing craft, frames for all jeeps, and vital parts for scores of fighting vehicles — has been "beaten into plowshares" to produce priority equipment for agriculture.

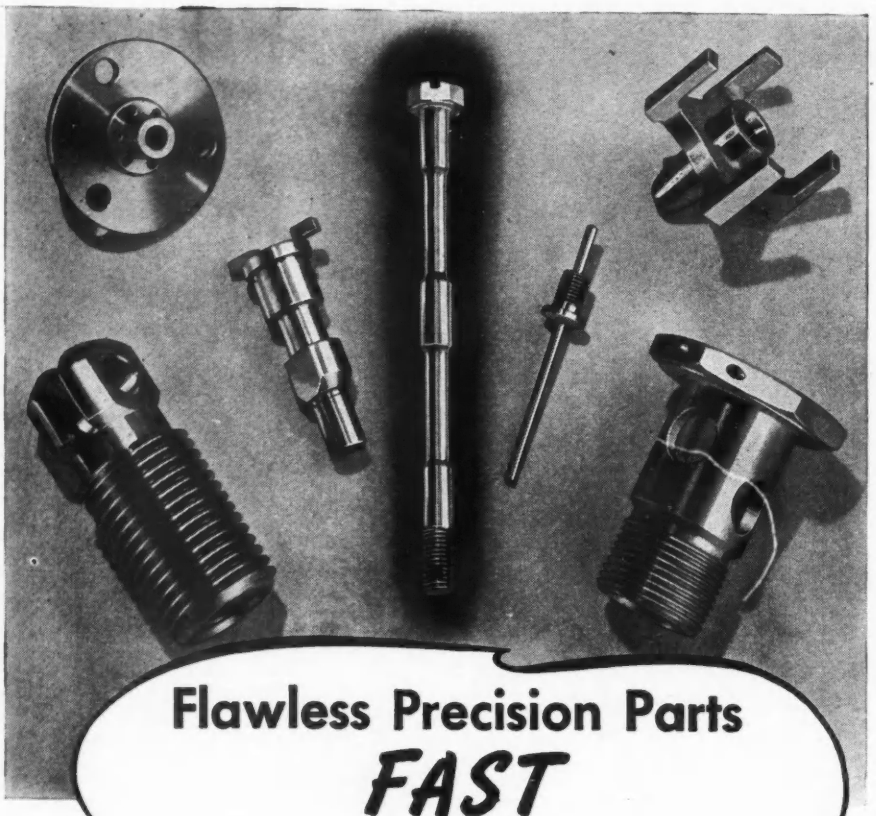
The particular steel was N-A-X 9120, a carburizing grade. Its ready response to carburization and heat-treatment is utilized to produce a farm implement that is "tough to the core" and that has the required surface hardness to resist abrasion and wear.

The conversion of an N-A-X low-alloy steel from tools of war to tools of peace is not surprising . . . just prophetic. For the same wide range of desirable properties that made these fine-grained steels a great military material recommends their use in civilian products.

GREAT STEELS FROM GREAT LAKES

GREAT LAKES STEEL
Corporation

N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN
UNIT OF NATIONAL STEEL CORPORATION



Flawless Precision Parts
FAST
No matter how tight your specifications

Western has the vast variety of modern screw machine equipment to meet your needs with quantity production economy

Here at Western you find the wide range of equipment needed to turn special parts from as small as .050" o.d. to as large as 4⅝" round — precision equipment which, backed by careful planning, long experience and skilled operators, enables us to meet the rigid specifications demanded by new peace-time products . . . Western Automatic produces fast and economically the fussiest jobs, large or small. We have also all facilities for precision secondary operations — tapping, threading, drilling, milling, grinding, heat-treating, pentrating. A single order brings you finished part or assembly in any quantity, promptly, ready for installation — a great saving of bother and scheduling, as hundreds of our customers know. Our engineering department is glad to help you with technical or design problems. Send in your inquiries today.

Aircraft Products Division
Western Automatic
Machine Screw Company
724 Lake Ave., Elyria, O.
Precision Parts and Assemblies Since 1873

In four years' production, the process has required only mechanical improvements.

Later a tank 4 ft. 10 in. by 28 ft. by 5 ft. was installed to take bars as well as other work. The installation has a capacity for treating 60 tons a day and is used for wire, rod, and bar stock of various grades of stainless steel.

Until now, extension of the process has been restricted because of the critical war need for sodium, particularly in the manufacture of tetraethyl lead for aviation gasoline. The easing of war restrictions makes the process immediately available for general use in the United States free of license or royalty.

Marmon-Herrington Truck

(*Continued from page* 23)

shoes and thus is independent of the front hook-up. A ratchet is provided on the service brake pedal. Controls are arranged for standing or seated driving. Clutch and brake pedals may be operated independently, or both with one foot.

An auxiliary transmission provides two speed ranges, a low range for frequent stop operation and a high range for driving to and from the route, making a total of six forward speeds and two reverse speeds. Major specifications of the Delivr-All follow:

ENGINE—3⅛ in. bore by 4⅜ in. stroke, four-cyl, L-head, 60 hp, 134 cu in. displacement, 105 lb-ft torque at 2000 rpm, downdraft carburetor, battery ignition, oil bath air cleaner and oil filter. The Delivr-All engine is the Willys Jeep unit.

TRANSMISSION—Three speeds in each of two ranges:

Speed	High Range (1.00 to 1)	Low Range (1.97 to 1)
3rd	1.00 to 1	1.97 to 1
2nd	1.564 to 1	3.08 to 1
1st	2.665 to 1	5.25 to 1
Reverse	3.554 to 1	7.00 to 1

AXLE—Special Marmon-Herrington front driving axle with constant velocity universal joint steering ends. Drive from engine through double reduction helical gear set. Reduction 7.10 to 1. Total max reduction 37.31 to 1.

REAR SUSPENSION — Independently sprung wheels.

TREAD—Front 66 in., rear 64½ in.

WHEELBASE—90 in.

OVERALL WIDTH—78 in.

OVERALL HEIGHT—94 in.

LOAD SPACE—75 in. height, 73 in. width, and 61 in. length.

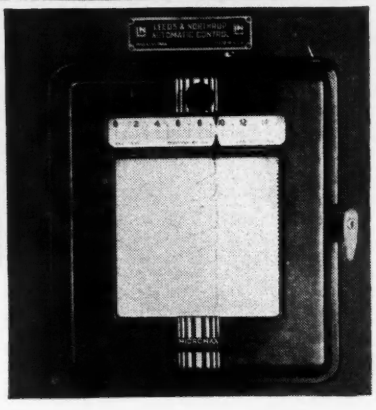
TURNING RADIUS—24 ft.

BODY WIDTH (outside)—75 in.

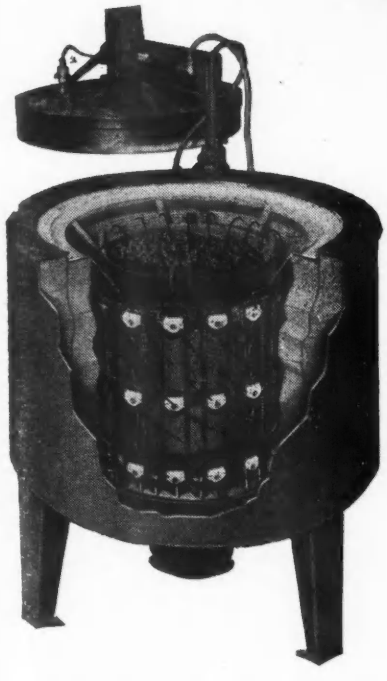
TIRES — Front 7.50-16 8-ply, rear 8.25-18 10-ply.

SERVICE BRAKES — Hydraulic 4-wheel.

WEIGHTS—Empty weight 4300 lb; gross weight 8500 lb.



Croname, Inc., Chicago, heat-treats aluminum in these 5 Homo Furnaces. Note evenness of soak temperatures in varied records at right.



Break-away view shows how features which Homo pioneered 20 years ago enable modern Homo to heat-treat with extreme uniformity. Air stream from fan directly beneath the work holds its swirl as it hits work—doesn't channel—penetrates any load evenly. Homo saves space—needs only enough area for the compact furnace shell.

HOMO FORCED-CONVECTION METHOD MEETS ALUMINUM'S CHANGING NEEDS

The heat-treating problem which requires temperature to be raised or lowered slightly but frequently was one which faced Croname, Inc., when that firm added war production to its nameplates and many other products.

For Croname began making aluminum-alloy Deflector Plates for air-cooled warplane engines. And metallurgical control of these plates is so close that heat-treating temperature cannot remain at fixed points. It must be variable in small, accurate steps, to match variations in the analyses of alloy and changes in size of parts.

To handle these requirements in production for peace as for war, Croname employs the Homo Method. The sound basic design and many refinements of the Homo Furnace gives it quick response and highly uniform distribution of heat. And the Micromax Recording Controller has the accuracy and dependability to bring the furnace with exactness to the specified temperature. Each load can have a different soak—or all can have the same; Homo Method holds them equally within the strictest specifications for uniform, rejection-free heat-treatment.

Catalog T-625 describes the Homo Method and will be sent on request. But, if you have a specific heat-treating problem, an L&N engineer would like to explain what we can do to help solve it.

LEEDS & NORTHRUP COMPANY, 4966 STENTON AVE., PHILA., PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS • TELEMETERS • AUTOMATIC CONTROLS • HEAT-TREATING FURNACES

Jrl Ad T-625(33)

Why GM Rejected Claims

(*Continued from page 64*)

By using broad statistical generalizations the OWMR memo has obscured the vital point that industries and corporations differ widely in their profitability. During every year of the 30's over one-half of the corporations reporting to the Bureau of Internal Revenue showed no net profits whatever, and of course paid no tax on profits. If wages had been fixed according to the profits of the above-average corporations, or of the above-average corporation in each industry, the number of corporations with net profits would have been greatly reduced and the number able to continue in business would have been reduced, the demand for labor would have been less and the number of unemployed increased.

Another analysis purporting to show the presumed "ability of the automobile industry to pay" increased wages without increasing prices has been recently released by the Department of Commerce and the Union has cited it in public statements in support of its position. This analysis also rests on certain assumptions regarding 1946 business based on prewar data. Since the data upon which this analysis is based have not been published it is impossible to make a detailed criticism of the conclusions. However one point should be made with reference to it. The analysis states that even with an *increase of 25 per cent* in wage rates the automobile manufacturers could make money at about 2,000,000 cars per year. On the other hand an analysis by the War Production Board of so-called "break-even points" in many industries, which the WPB released last spring, stated that the break-even point of the automobile industry was 55 per cent of capacity or about 3,300,000 cars at *current* wage rates! While it is possible that both of these analyses may be wrong, it is obvious they are not both right. It would seem that the Government statisticians at least ought to get together on their stories before they release them to the public and not be contradicting each other in their analyses of the same situation.

We have questioned the accuracy of these analyses as applying to the country as a whole and particularly to the automobile industry. We cannot say what the correct conclusion may be for either the nation as a whole or the automobile industry, but we do know that they are incorrect as applied to our particular business. As far as the OWMR report is concerned, the saving of 4½ per cent due to savings in overtime premiums, 9½ per cent in reduction of wage rates or down grading and 10 per cent in savings due to the elimination of the excess profits tax, instead of adding up to 24 per cent, as applied to our business adds up to zero.

In building up our costs and prices under the OPA formula and attempting to meet the demand for automobiles and our other products, we have allowed for overtime since we expect to work at least as much overtime and probably more in 1946 than we did in 1941. So there will be no saving to us in overtime premiums. Since our wage rates by job classifications are not being reduced, there can be no saving at all upon "down grading."

So far as the "saving" due to the elimination of the excess profits tax is concerned, if we expand our plants and do more business we should be allowed to make a return on the additional investment. In addition the normal corporation taxes remain much higher than they were in prewar years so that as far as the elimination of excess profits tax is concerned (which was really done to stimulate business and expand production) there is no saving here that can properly be used to make wage increases. General Motors again rejects wage demands based on the "take-home pay" purchasing power theory or on "ability to pay" based on current assets or assumed future profits.

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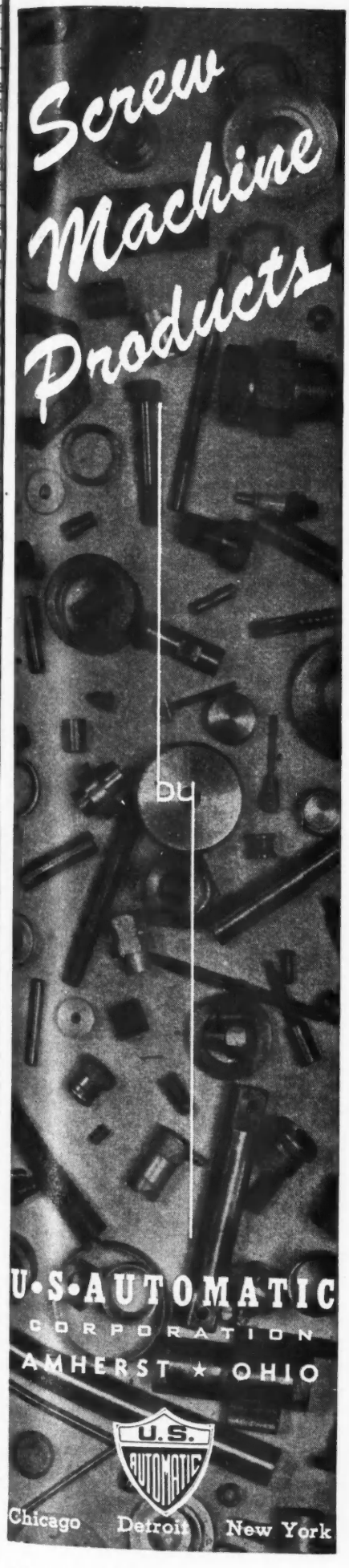

Metal Market Facing Crucial Period

(*Continued from page* 42)

calculations based on the flow of material directly from the rolling mill into consumption, which until now has been general. A heavy carryover of sheets and strip by consumers might inject an entirely new problem into the analyzing of steel statistics. The backlog of the leading steel producer's unfilled orders was recently placed by its president as equivalent to four months' production or to six months' production at 75 per cent of capacity. The shortages of labor next to that of coke, caused by the recent coal strike, continues to be the principal cause of output deficiencies. Acuteness of the labor shortage is brought home by a recent report that 28 per cent of the employes of a large steel company were working overtime.

Magnesium in all its forms has been ordered exempted from inventory control.

Little is known so far as to the extent to which tin supplies will shrink as the result of the renewed outbreaks of strife in the Dutch East Indies from where both Banka and Billiton tin come to the American market. Conditions in the Malayan tin producing districts are reported to be steadily improving and an American delegation of mining engineers is making an extensive survey of the situation in the entire Asiatic production area.

Air Express Shipments

International air express shipments handled in September scored an 18.8 per cent gain over the same month 1944, according to the Air Express Division of Railway Express Agency.

Charges paid by shippers on this international traffic amounted to $97,159, a gain of 33.6 per cent for the month over the same period last year.

A constant preponderance of outgoing over incoming traffic was maintained throughout the month with drug shipments featuring the export traffic.

Traffic at the following airport cities was included in this report: Miami, New Orleans, Brownsville, Seattle, San Francisco (Mills Field), New York, Los Angeles, Fort Worth, San Antonio, El Paso and Laredo.

New Airplane Power Plant

(*Continued from page* 28)

power fastest planes, it will give ranges greater than may be possible with pure jet propulsion. When flying at slow speeds, at low altitudes, the gas turbine uses more fuel than a reciprocating engine would use cruising under similar conditions, but when operating at full power at high altitudes the turbine uses less fuel than a conventional engine operating at maximum power.

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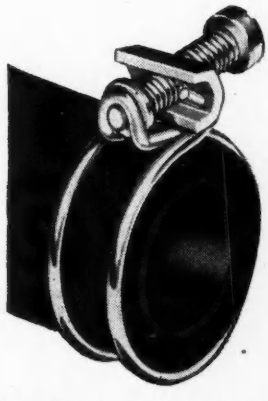

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Application of High Strength Plastic To Monocoque Wing Construction

(*Continued from page* 27)

stress for Fiberglas reinforced plastics, the allowable is between 61,000 and 84,000 psi. This, of course, is based upon back compression wherein the skin is perfectly stabilized. In the subject plastic design the stresses are sufficiently low so that the stabilizing effect of the core could be almost ignored, especially in view of the mutual stiffness and support of the multiple tubular construction. In effect then, the greatest usefulness of the core is to provide compression backing for the original molding pressure which may be as much as 100 psi. The last section analyzed at station 195.5 shows maximum bending stresses of 8070 psi in compression. While this stress is very small compared with the allowable ultimate, the skins being 0.025 and 0.020 in. thick for the outer and inner surfaces respectively, they are more dependent upon the core for stabilization. All values, however, are very low, which may be taken as a sign of efficient distribution of bending material. Furthermore, the results are indicative of greater possibility for refinement of design to obtain better results than are shown here.

So far it has been pointed out that a reduction of tools and fixtures and manufacturing manhours may be secured if a plant is properly set up to produce plastic wings. In addition one of the most important contributions to the efficient performance of aircraft is obtainable by a reduction of normal gross weight. Table I includes data for calculating the weight per unit length of span of the plastic wing. The skin gages and depth of core materials are the same as those used in the sectional properties for the calculation of bending stresses discussed previously.

Fig. 3 consists of a plot of the unit weights of both the metal and plastic outer wing panel. As a point of interest, it is to be pointed out that while the plastic unit weight per in. of span at station 60.5 is slightly greater than the metal wing, there is a considerable drop and deviation at the end station. On the basis that all efficient structures should be just strong enough to support the ultimate design load imposed upon them without failure, it can be seen that the plastic distribution of material is more conducive to an optimum weight saving. Calculating the total weight of the metal wing which is 181.5 lb and that of the plastic counterpart which is 133 lb, a net saving of weight equal to 48.5 lb can be obtained.

In conclusion, it must be remembered that the method of fabrication by low pressure molding is a fairly recent development and consequently, a comparatively crude one as compared with the techniques developed for metal fabrication. Furthermore, the aircraft industry being trained in the handling and processing of light alloys is strictly metal minded. Therefore, knowing little about a process as foreign to them as the low pressure method of fabrication, aircraft people as a whole will not take kindly to any proposal suggesting a change in their present system. It will take time and work along this line and will have to be done in small steps before a job as extensive as the wing design proposed here will be attempted on a production contract basis. But present indications point toward the actual realization of a production plastic wing some day in the very near future. Maybe such a wing will not be patterned after the one suggested here; however, if due consideration is given to the inherently useful properties of plastic and particularly to the fact that these materials do not lend themselves to metal design practices, it is certain to be an efficient as well as an economical one.

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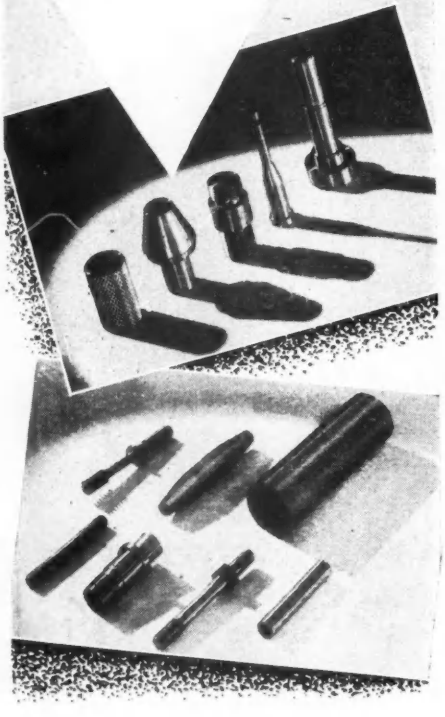

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Emsworth, Pittsburgh 2, Pa.

ASCO QUALITY

Opposes Wages Based On Company Profits

(*Continued from page* 17)

prewar worker efficiency and prewar overhead costs must be restored before profits will equal prewar levels under the OPA pricing formula.

Ruether also is playing to the public gallery by demanding that all facts and figures dealing with GM production costs and profits be brought out for public scrutiny. This the corporation so far has refused to do on the ground that they are not a legitimate part of a wage negotiation. There is every indication that GM and other automobile companies will resist to the bitter end any efforts to make profits the basis for factory wage rates.

To date the appeal to the public by both sides has been more intensive than in any previous dispute. Each side realizes that having the backing of the public at large is an important factor and both have gone to the people. In this battle of print and speeches the unions apparently have an advantage and are capitalizing it to the limit. They know that any program for higher wages for less work with no increase in the price of the product is bound to have popular appeal, especially when it is made to sound plausible to the man in the street. Also the public does not understand the competitive reasons why GM and other companies cannot divulge their costs, and therefore is skeptical. However, General Motors has done a good job in advertisements outlining its position and can be expected to hold its own.

Some observers say the wage issue probably could be resolved for the present by a temporary increase of from 12 to 17 per cent with further increases negotiated later if volume production permits. However, it is evident that whatever the outcome now, the wage question will be a source of trouble for a long time to come. The union brief calls for an average rate of $1.35 per hour which would represent a 30 per cent boost. However, it also states that when full production is reached next March the company could afford to pay $1.95 per hour and still make larger profits than before the war. It intimated that the 30 per cent was only a starting point and that the union would press for more if and when volume hits the increased postwar mark aimed at by GM.

The automotive parts industry also will be presented with a 30 per cent boost demand according to present union plans. The union has been building up a case to show that the industry can afford to raise wages in conformity with those being demanded of the automobile manufacturers.

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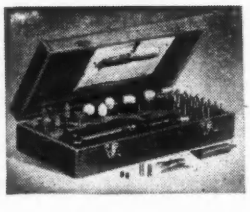

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(*Continued from page* 35)

long. On the other hand, for small defects at shorter distances such as one ft it is desirable to use a frequency of five megacycles with a ½ in. square searching unit. The reason for this is that the lower frequencies having a longer wave length, pass around small defects and reflect only from the larger defects such as cracks, voids, etc. The higher frequency waves will be reflected from small as well as large defects because of the shorter wave length.

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